NASA SP-7011 (392)
September 1994

AEROSPACE MEDICINE AND BIOLOGY

(NASA-SP-7011(392)) AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 392) (NASA) 45 p

N94-37445

Unclas

00/52 0020065

A CONTINUING BIBLIOGRAPHY WITH INDEXES

NASA STI PROGRAM
SCIENTIFIC & TECHNICAL INFORMATION

The NASA STI Program ... in Profile

Since its founding, NASA has been dedicated to the advancement of aeronautics and space science. The NASA Scientific and Technical Information (STI) Program plays a key part in helping NASA maintain this important role.

The NASA STI Program provides access to the NASA STI Database, the largest collection of aeronautical and space science STI in the world. The Program is also NASA's institutional mechanism for disseminating the results of its research and development activities.

Specialized services that help round out the Program's diverse offerings include creating custom thesauri, translating material to or from 34 foreign languages, building customized databases, organizing and publishing research results ... even providing videos.

For more information about the NASA STI Program, you can:

- **Phone** the NASA Access Help Desk at (301) 621-0390
- **Fax** your question to the NASA Access Help Desk at (301) 621-0134
- **E-mail** your question via the **Internet** to help@sti.nasa.gov
- **Write** to:

  NASA Access Help Desk
  NASA Center for AeroSpace Information
  800 Elkridge Landing Road
  Linthicum Heights, MD 21090-2934

NASA SP-7011 (392)
September 1994

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

National Aeronautics and Space Administration
Scientific and Technical Information Program
Washington, DC 1994

This publication was prepared by the NASA Center for AeroSpace Information,
800 Elkridge Landing Road, Linthicum Heights, MD 21090-2934, (301) 621-0390.

INTRODUCTION

This issue of *Aerospace Medicine and Biology* (NASA SP-7011) lists 81 reports, articles, and other documents recently announced in the NASA STI Database. The first issue of *Aerospace Medicine and Biology* was published in July 1964.

Accession numbers cited in this issue include:

Scientific and Technical Aerospace Reports (STAR) (N-10000 Series)	N94-33357 — N94-35225
Open Literature (A-60000 Series)	A94-60001 — A94-60255

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which humans are subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Applied research receives the most emphasis, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the publication consists of a standard bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations include the original accession numbers from the respective announcement journals.

Seven indexes—subject, personal author, corporate source, foreign technology, contract number, report number, and accession number—are included.

A cumulative index for 1994 will be published in early 1995.

Information on availability of documents listed, addresses of organizations, and CASI price schedules are located at the back of this issue.

PAGE ii INTENTIONALLY BLANK

TABLE OF CONTENTS

Category 51 Life Sciences (General) 243

Category 52 Aerospace Medicine 244
Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

Category 53 Behavioral Sciences 248
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

Category 54 Man/System Technology and Life Support 252
Includes human engineering; biotechnology; and space suits and protective clothing.

Category 55 Space Biology 259
Includes exobiology; planetary biology; and extraterrestrial life.

Subject Index A-1
Personal Author Index B-1
Corporate Source Index C-1
Foreign Technology Index D-1
Contract Number Index E-1
Report Number Index F-1
Accession Number Index G-1
Appendix APP-1

PAGE iv INTENTIONALLY BLANK

TYPICAL REPORT CITATION AND ABSTRACT

NASA SPONSORED
ON MICROFICHE

ACCESSION NUMBER → **N94-11045*#** Pennsylvania State Univ., Hershey. Coll. of Medicine. ← CORPORATE SOURCE

TITLE → **EFFECTS OF CSF HORMONES AND IONIC COMPOSITION ON SALT/WATER METABOLISM Final Technical Report, 1 Mar. 1981 - 31 Dec. 1992**

AUTHOR → WALTER B. SEVERS 31 Dec. 1992 32 p ← PUBLICATION DATE

CONTRACT NUMBER → (Contract NCC2-127)

REPORT NUMBERS → (NASA-CR-193232; NAS 1.26:193232) Avail: CASI HC A03/MF A01 ← AVAILABILITY AND PRICE CODE

The consequences of headward fluid shifts during manned spaceflight was studied. Such shifts were recognized early by both U.S. and Soviet scientists because of signs and symptoms referable to the head. Some of these include disturbed vision, puffiness in the face and periorbital areas, headache, vestibular dysfunction, and distended jugular veins. We posited that the fluid shift had an immediate effect on the brain and a long-term action requiring a neural interpretation of the flight environment. This would re-adjust both efferent neural as well as hormonal mechanisms to sustain cardiovascular and fluid/electrolyte balance consonent with survival in microgravity. Work along these lines is summarized. A synopsis of some of the main research is presented. The following topics were studied: (1) angiotensin and vasopressin action in the central nervous system; (2) intracranial pressure control; (3) research on *subcommissural organ; and (4) research on the eye.*

Author (revised)

TYPICAL JOURNAL ARTICLE CITATION AND ABSTRACT

ACCESSION NUMBER → **A94-60203**

TITLE → **ESTIMATION OF THE LOW-EARTH-ORBIT DEBRIS *POPULATION AND DISTRIBUTION***

AUTHORS → KYLE T. ALFRIEND General Research Corp., VA and D. LAURIE LEWIS ← AUTHORS' AFFILIATION

Journal of Spacecraft and Rockets (ISSN 0022-4650) vol. 31, no. 1 January-February 1994 p. 48-53 refs ← JOURNAL TITLE ← PUBLICATION DATE

REPORT NUMBER → (BTN-94-EIX94311322893) Copyright

In this paper, an algorithm for estimating the low-Earth-orbit space object population and distribution from measurements taken by a vertical, staring narrow beam radar is developed and validated. The radar measures the altitude, inclination, and radar cross section of each object which passes through the beam. The effects of the assumptions made in developing the algorithm and measurement errors are discussed. An estimate of the operational time of the radar needed to achieve a specified accuracy in the space object population is also developed. EI

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 392)

September 1994

51
LIFE SCIENCES (GENERAL)

N94-33564* National Aeronautics and Space Administration, Washington, DC.
ASSISTING WINE GROWERS (Videotape)
1993 Videotape: 6 min. 25 sec. playing time, in color, with sound (NASA-TM-109812; NONP-VT-94-12940) Avail: CASI VHS A01/BETA A22

This video documents efforts at NASA Ames Research Center to assist wine growers in the Napa valley in their fight against a root parasite which is destroying millions of dollars worth of grape crops. NASA researchers are using airborne scanners and remote sensing equipment to detect the parasite before it becomes entrenched, so that growers can treat the harvest to resist infestation. CASI

N94-33658*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
CONTINUOUS MONITORING OF BACTERIAL ATTACHMENT Abstract Only
D. W. KOEING (Krug Life Sciences, Inc., Houston, TX.), S. K. MISHRA (Krug Life Sciences, Inc., Houston, TX.), and D. L. PIERSON *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 599 Jan. 1994
Avail: CASI HC A01/MF A03

A major concern with the Space Station Freedom (SSF) water supply system is the control of longterm microbial contamination and biofilm development in the water storage and distribution systems. These biofilms have the potential for harboring pathogens as well as microbial strains containing resistance factors that could negatively influence crew health. The proposed means for disinfecting the water system on SSF (iodine) may encourage the selection of resistant strains. In fact, biofilm bacteria were observed in water lines from the Space Shuttle Columbia (OV-102); therefore, an alternative remediation method is required to disinfect spacecraft water lines. A thorough understanding of colonization events and the physiological parameters that will influence bacteria adhesion is required. The limiting factor for development of this technology is the ability to continuously monitor adhesion events and the effects of biocides on sessile bacteria. Methods were developed to allow bacterial adhesion and subsequent biocidal treatment to be monitored continuously. This technique couples automated image analysis with a continuous flow of a bacterial suspension through an optical flow cell. A strain of Pseudomonas cepacia isolated from the water supply of the Space Shuttle Discovery (OV-103) during STS-39 was grown in a nitrogen-limited continuous culture. This culture was challenged continuously with iodine during growth, and the adhesion characteristics of this strain was measure with regard to flow rate. Various biocides (ozone, hypochlorite, and iodine) were added to the flow stream to evaluate how well each chemical removed the bacteria. After biocide treatment, a fresh bacterial suspension was introduced into the flow cell, and the attachment rate was evaluated on the previously treated surface. This secondary fouling was again treated with biocide to determine the efficacy of multiple batch chemical treatments in removing biofilm.
Author (revised)

N94-33734# Los Alamos National Lab., NM.
PHASE-SENSITIVE FLOW CYTOMETRY: NEW TECHNOLOGY FOR ANALYZING BIOCHEMICAL, FUNCTIONAL, AND STRUCTURAL FEATURES IN FLUOROCHROME-LABELED CELLS AND PARTICLES
J. A. STEINKAMP 1993 4 p Presented at the 4th Laser Applications to Chemical Analysis Meeting, Jackson Hole, WY, 8-11 Mar. 1994
(Contract W-7405-ENG-36)
(DE94-003960; LA-UR-93-3960; CONF-940341-2) Avail: CASI HC A01/MF A01

Flow cytometry (FCM) instruments rapidly measure biochemical, functional, and cytological properties of individual cells and macromolecular components, e.g., chromosomes, for clinical diagnostic medicine and biomedical and environmental research applications. These measurements are based on labeling cells with multiple fluorochromes for correlated analysis of macromolecules, such as DNA, RNA, protein, and cell-surface receptors. This report describes the development of a phase-sensitive flow cytometer that provides unique capabilities for making laser-excited, phase-resolved measurements on fluorochrome-labelled cells and particles.
DOE

N94-33770* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, FL.
KSC WILDLIFE SHOW (Videotape)
1994 Videotape: 30 min. playing time, in color, with sound (NASA-TM-109808; NONP-VT-94-12936) Avail: CASI VHS A01/BETA A22

This video highlights footage of the many forms of animal and plant life that inhabit the environs surrounding KSC. Shown are birds, alligators, butterflies, and plants as they react to shuttle launches and other activities eminating from KSC. CASI

N94-34008# Stanford Univ., CA. Dept. of Biological Sciences.
ENZYMOLOGY AND MOLECULAR BIOLOGY OF CELL WALL BIOSYNTHESIS
P. M. RAY 20 Mar. 1993 7 p
(Contract DE-FG03-91ER-20048)
(DE94-008585; DOE/ER-20048/2) Avail: CASI HC A02/MF A01

In order to be able to explore the control of cell wall polysaccharide synthesis at the molecular level, which inter alia might eventually lead to means for useful modification of plant biomass polysaccharide production, the immediate goals of this project are to identify polypeptides responsible for wall polysaccharide synthase activities and to obtain clones of the genes that encode them. We are concentrating on plasma membrane-associated (1,3)-beta-glucan synthase (glucan synthase-II or GS-II) and Golgi-associated (1,4)-(beta)-glucan synthase (glucan synthase-I or GS-I), of growing pea stem tissue. Our progress has been much more rapid with respect to GS-II than regarding GS-I. DOE

52
AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

A94-60201
MARS TRANSFER VEHICLE USING REGOLITH AS PROPELLANT
BRIAN FILLOTSON Boeing Defense and Space Group, Huntsville, AL Journal of Spacecraft and Rockets (ISSN 0022-4650) vol. 31, no. 1 January-February 1994 p. 60-66 refs
(BTN-94-EIX94311322895) Copyright

This paper describes a manned Mars mission architecture that uses planetary regolith from the moon and from Deimos as propellant and as radiation shielding. It presents a points design that uses a mass driver as a rocket engine to eject regolith propellant at high speed, a solar array as a power source for the mass driver, and equipment to acquire and transport regolith to the Mars vehicle. A mission for the 2015 Earth-Mars conjunction is analyzed to assess vehicle mass and crew radiation exposure. EI

A94-60203
ESTIMATION OF THE LOW-EARTH-ORBIT DEBRIS POPULATION AND DISTRIBUTION
KYLE T. ALFRIEND General Research Corp., Vienna, VA and D. LAURIE LEWIS Journal of Spacecraft and Rockets (ISSN 0022-4650) vol. 31, no. 1 January-February 1994 p. 48-53 refs
(BTN-94-EIX94311322893) Copyright

In this paper, an algorithm for estimating the low-Earth-orbit space object population and distribution from measurements taken by a vertical, staring narrow beam radar is developed and validated. The radar measures the altitude, inclination, and radar cross section of each object which passes through the beam. The effects of the assumptions made in developing the algorithm and measurement errors are discussed. An estimate of the operational time of the radar needed to achieve a specified accuracy in the space object population is also developed. EI

N94-33380# Yale Univ., New Haven, CT. School of Medicine.
CELLULAR ANALYSIS OF THE STARTLE REFLEX Annual Report, 1 Sep. 1992 - 31 Aug. 1993
MICHAEL DAVIS 31 Aug. 1993 2 p
(Contract F49620-92-J-0300)
(AD-A278243; AFOSR-94-0224TR) Avail: CASI HC A01/MF A01

In the ASSERT Award we are interested in how dopamine agonists affect baseline startle amplitude as well as the phenomenon of pre-pulse inhibition. To test this, we have been recording the compound action potential generated by an auditory stimulus at the level of the cochlear nucleus in freely moving rats using a bundle of four previously implanted 25 micrometers nichrome wires. Each of the dopamine agonists increased the amplitude of the auditory nerve response (NI component, latency =0.75 msec). This effect is larger following repeated administration of d-amphetamine on each of 7 days, indicating that it shows sensitization. This suggests that dopamine agonists ultimately can alter processes at the very beginning of the auditory system, which we believe may have considerable relevance for dopamine-induced disruption of auditory prepulse inhibition as well as auditory distractibility and even auditory hallucinations in people. DTIC

N94-33499*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
OVERVIEW OF NASA HUMAN RESPONSE TO SONIC BOOM PROGRAM
KEVIN P. SHEPHERD *In its* First Annual High-Speed Research Workshop, Part 3 p 1287-1291 Apr. 1992
Avail: CASI HC A01/MF A06

For some routes the ability to fly at supersonic speeds over land as well as over water would greatly enhance the time benefit to the passenger. It would also increase the productivity and economic viability of the aircraft. There are no reliable guidelines which can be used to determine a sonic boom exposure which would be acceptable for overland supersonic flight. In addition to the peak pressure of the sonic boom, the detailed shape of the signature will also influence the perception, and therefore the community response, to sonic boom exposures. Initially, the program aims to develop the capability to predict human response to individual sonic booms. This will enable a quantitative assessment of the benefit of 'low boom' aircraft configurations and will also serve to guide the design of the aircraft and its operating conditions. This capability will form the foundation of studies to determine the relationship between sonic boom exposure and community response. Only then will it be possible to assess the feasibility of acceptable overland supersonic flight. Author (revised)

N94-33545# Armed Forces Inst. of Pathology, Washington, DC.
EFFECT OF BARBITURATES AND HYPEROXIA ON LIPID PEROXIDATION IN HYPOXIC NEURONS Annual Technical Report, Apr. 1992 - Apr. 1993
WILLIAM J. MEHM 15 Apr. 1993 2 p
(Contract F49620-92-J-0166)
(AD-A278467; AFOSR-94-0220TR) Avail: CASI HC A01/MF A01

This grant was funded for the project 'Effects of Barbiturates and Hyperoxia on Lipid Peroxidation in Hypoxic Neurons' with Chiger, Anderson and Mehm as investigators. The principle investigator departed before any research began. When a new investigator arrived, we found that the proposed model was not appropriate for the research question. We have proposed a change in the research protocol and principle investigator and have requested a not-cost extension. The proposed protocol is 'Oxygen Tension Effects on Wound Healing Molecular Mechanisms' with Kulesh, Anderson and Mehm as investigators. Since that request has not yet been approved, no research has been done. DTIC

N94-33637*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
RESPONSE TO GRADED LOWER BODY NEGATIVE PRESSURE (LBNP) AFTER SPACE FLIGHT Abstract Only
S. FORTNEY, J. CHARLES, M. WOOD, and T. DUSSACK *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 495 Jan. 1994
Avail: CASI HC A01/MF A03

The effects of space flight on orthostatic function were studied. LBNP tests (0 to -60 mmHg) were administered to 7 crew members preflight and 2 to 6 hrs after 6 to 9 day shuttle missions. Cardiac stroke volumes were obtained each minute by echo Doppler. Orthostatic responses are given. The data suggest a decline in postflight orthostatic function, as assessed by LBNP, due to reduced cardiac filling despite potentiated heart rate and vasoconstrictor reflex responses in most crew members. Derived from text

N94-33638*# Krug Life Sciences, Inc., San Antonio, TX.
DUAL-CYCLE ERGOMETRY AS AN EXERCISE MODALITY DURING PREBREATHE WITH 100 PERCENT OXYGEN Abstract Only
CRISTINE L. HEAPS, MICHELE D. FISCHER, and JAMES T. WEBB *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 496 Jan. 1994 Prepared in cooperation with Aerospace Medical Research Labs., Brooks AFB, TX
Avail: CASI HC A01/MF A03

In an effort to reduce prebreathe time requirements prior to extravehicular activities and high-altitude flights, a combined arm and leg exercise task proposes to enhance denitrogenation by

incorporation of both upper and lower body musculature at a moderately high work intensity during prebreathe with 100% oxygen. Preliminary findings indicated peak oxygen consumption (VO2peak) levels attained on the dual-cycle ergometer do not differ significantly from those levels attained on the treadmill. Eight male subjects were exercised to VO2peak using leg-only cycle ergometry and dual-cycle ergometry on separate days. Preliminary data during dual-cycle ergometry showed arm work equaling 30% of the leg workrate at each stage of the incremental test resulted in arm fatigue in several subjects and a reduced VO2peak compared to dual-cycle ergometry with arm work at 20%. Thus, the 20% workrate was used during the dual-cycle VO2peak trial. On a third experimental day, subjects performed a 10 minute exercise test at a workrate required to elicit 75% of VO2peak for each subject on the dual-cycle ergometer. Blood lactate response to the exercise was monitored as an objective measure of fatigue. Peak VO2 levels attained on the leg-only and the dual-cycle ergometry tasks were not significantly different. Blood lactate levels were significantly elevated following the dual-cycle ergometry at 75% VO2peak. However, lactate levels show the expected rate of decline during recovery and, as demonstrated in the literature, should return to baseline levels within 30 minutes following exercise cessation. Thus, dual-cycle ergometry at 75% VO2peak appears to be a valid exercise for use during prebreathe and should not contribute to fatigue during subsequent EVA's. Author (revised)

N94-33639*# Krug Life Sciences, Inc., San Antonio, TX.
EXERCISE WITH PREBREATHE APPEARS TO INCREASE PROTECTION FROM DECOMPRESSION SICKNESS: PRELIMINARY FINDINGS
JAMES T. WEBB, MICHELE D. FISCHER, CRISTINE L. HEAPS, and ANDREW A. PILMANIS *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 497-500 Jan. 1994 Sponsored in part by Aerospace Medical Research Labs.
(Contract NASA ORDER T-82170; F33615-89-C-0603; F33615-92-C-0018)
Avail: CASI HC A01/MF A03

Extravehicular activity (EVA) from the Space Shuttle involves one hour of prebreath with 100% oxygen, decompression of the entire Shuttle to 10.2 psia for at least 12 hours, and another prebreath for 40 minutes before decompression to the 4.3 psia suit pressure. We are investigating the use of a one-hour prebreathe with 100% oxygen beginning with a ten-minute strenuous exercise period as an alternative for the staged decompression schedule described above. The 10-minute exercise consists of dual-cycle ergometry performed at 75% of the subject's peak oxygen uptake to increase denitrogenation efficiency by increasing ventilation and perfusion. The control exposures were preceded by a one-hour prebreathe with 100% oxygen while resting in a supine position. The twenty-two male subjects were exposed to 4.3 psia for 4 hours while performing light to moderate exercise. Preliminary results from 22 of the planned 26 subjects indicate 76% DCS following supine, resting prebreathe and 38% following prebreathe with exercise. The staged decompression schedule has been shown to result in 23% DCS which is not significantly different from the exercise-enhanced prebreathe results. Prebreathe including exercise appears to be comparable to the protection afforded by the more lengthy staged decompression schedule. Completion of the study later this year will enable planned statistical analysis of the results. Author (revised)

N94-33640*# Army Research Inst. of Environmental Medicine, Natick, MA.
ORTHOSTATIC RESPONSES TO DIETARY SODIUM RESTRICTION DURING HEAT ACCLIMATION
PATRICIA C. SZLYK, INGRID V. SILS, DAVID M. CARETTI, ROBERT J. MOORE, LAWRENCE E. ARMSTRONG, KIM A. TARTARINI, RALPH P. FRANCESCONI, ELDON W. ASKEW, and ROGER W. HUBBARD *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 501-508 Jan. 1994
Avail: CASI HC A02/MF A03

Several studies have shown that individuals consuming low-salt diets and working in the heat have an increased risk or incidence of heat injury, suggestive of inadequate cardiovascular adjustment. Furthermore, others have shown that prolonged work in hot climates can precipitate orthostatic hypotension and syncope. This study was designed to evaluate the effects of moderate-salt (MS) and low-salt (LS) diets on the circulatory responses and incidence of presyncopal symptoms to an orthostatic test (OT) during successive days of heat acclimation (HA). Seventeen unacclimatized male soldiers (mean +/- SE: age 20+/-1 yrs) participated in this two-phase study. The first phase consisted of a seven day dietary stabilization period during which all subjects consumed similar diets of about 4000 kcal/day containing 8g NaCl and lived in a dormitory setting (21 C, 30% RH). The second phase commenced on day eight and consisted of dietary NaCl restriction and 10 days HA (days 8-17). Volunteers were randomly assigned to either the MS diet (n=9) providing 8g NaCl/day or the LS diet (n=8) furnishing just 4g NaCl/day. The acquisition of HA was manifested in both groups by reductions in exercising rectal temperature and heart rate (HR); these characteristics were similar in the MS and LS diets. The OT was performed at 21 C on day seven of the stabilization phase and on days 9, 11, 13, 15, and 17 of the HA phase, before and after 8.5 hr of intermittent treadmill walking in a hot environment. Blood pressure (BP) and HR responses at 1,2, and 4 min and any presyncopal symptoms were recorded after assuming an upright position from recumbency. All subjects completed the OT before and after prolonged exercise in the heat without incidence of either hypotension or presyncopal symptoms irrespective of dietary-salt intake and day of HA. The results indicate that the prolonged work in the heat can be performed without orthostatic hypotension or syncope while consuming 4g NaCl/day with adequate fluid replacement. Furthermore, the circulatory responses to OT showed no improvement with successive days of HA irrespective of dietary-salt intake. Author (revised)

N94-33641*# Naval Air Warfare Center, China Lake, CA.
TELEMEDICINE, VIRTUAL REALITY, AND SURGERY
PERCIVAL D. MCCORMACK and STEVE CHARLES *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 509-521 Jan. 1994
Avail: CASI HC A03/MF A03

Two types of synthetic experience are covered: virtual reality (VR) and surgery, and telemedicine. The topics are presented in viewgraph form and include the following: geometric models; physiological sensors; surgical applications; virtual cadaver; VR surgical simulation; telesurgery; VR Surgical Trainer; abdominal surgery pilot study; advanced abdominal simulator; examples of telemedicine; and telemedicine spacebridge. Derived from text

N94-33643*# Aerospace Medical Research Labs., Brooks AFB, TX.
THE EFFECTIVENESS OF GROUND LEVEL POST-FLIGHT 100 PERCENT OXYGEN BREATHING AS THERAPY FOR PAIN-ONLY ALTITUDE DECOMPRESSION SICKNESS (DCS)
JOHN T. DEMBOSKI and ANDREW A. PILMANIS *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 532-537 Jan. 1994
Avail: CASI HC A02/MF A03

In both the aviation and space environments, decompression sickness (DCS) is an operational limitation. Hyperbaric recompression is the most efficacious treatment for altitude DCS. However, the inherent recompression of descent to ground level while breathing oxygen is in itself therapy for altitude DCS. If pain-only DCS occurs during a hypobaric exposure, and the symptoms resolver during descent, ground level post-flight breathing of 100% O2 for 2 hours

(GLO2) is considered sufficient treatment by USAF Regulation 161-21. The effectiveness of the GLO2 treatment protocol is defined. Derived from text

N94-33644*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
EMERGENCY MEDICAL SERVICES
ROGER BILLICA and MICHAEL CHANDLER *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 538-539 Jan. 1994
Avail: CASI HC A01/MF A03

When NASA was established in 1958, it was known that space flight would require efforts beyond those of NASA to ensure the health and safety of our astronauts. On 10 Aug. 1958, a Secretary of Defense memorandum was signed that assigned the first Department of Defense (DOD) Manager to provide support to NASA for Project Mercury. This established a chain of command through the Joint Chiefs of Staff to the Secretary of Defense. The current charter is dated 19 Mar. 1986 and assigns the DOD Manager responsibilities to the Commander and Chief, US Space Command. The DOD Managers charter has many support areas and among them are recovery of astronauts and medical support. Today these efforts support the Space Shuttle and Space Station Programs. Briefly, the program works with each organization tasking the other through a requirements document. Level of care, communications, and recovery requirements are established; NASA and the DOD provide the capability to meet them. NASA is also responsible for the specialized training and equipment needed to meet these requirements. A Shuttle launch a KSC requires an Emergency Medical Services (EMS) coordinator on console to facilitate communications, ensure proper coverage, and coordinate with area hospitals. A contingent of NASA medical personnel are assembled to provide triage and medical support capabilities. The DOD provides medical evacuation (MEDEVAC) helicopters with surgeons and pararescue specialists (PJ's) or emergency medical technicians (EMT's). Each helicopter is equipped with at least one doctor and one PJ/EMT per astronaut crew member. Transoceanic abort landing (TAL) sites and end of mission (EOM) sites have similar structures, with TAL sites utilizing fixed wingg aircraft for MEDEVAC. The DOD also supports contingency planning for the support and return of crew members from the Space Station Freedom. Much of this support has been directed at the recovery of crew members following the landing of an Assured Crew Return Vehicle. Derived from text

N94-33645*# Army Inst. of Dental Research, Fort Meade, MD.
QUANTITATIVE 3-D IMAGING TOPOGRAMMETRY FOR TELEMEDICINE APPLICATIONS Abstract Only
BRUCE R. ALTSCHULER *In* NASA. Johnson Space Center, *Seventh Annual Workshop on Space Operations Applications and* Research (SOAR 1993), Volume 2 p 553 Jan. 1994
Avail: CASI HC A01/MF A03

The technology to reliably transmit high-resolution visual imagery over short to medium distances in real time has led to the serious considerations of the use of telemedicine, telepresence, and telerobotics in the delivery of health care. These concepts may involve, and evolve toward: consultation from remote expert teaching centers; diagnosis; triage; real-time remote advice to the surgeon; and real-time remote surgical instrument manipulation (telerobotics with virtual reality). Further extrapolation leads to teledesign and telereplication of spare surgical parts through quantitative teleimaging of 3-D surfaces tied to CAD/CAM devices and an artificially intelligent archival data base of 'normal' shapes. The ability to generate 'topograms' or 3-D surface numerical tables of coordinate values capable of creating computer-generated virtual holographic-like displays, machine part replication, and statistical diagnostic shape assessment is critical to the progression of telemedicine. Any virtual reality simulation will remain in 'videogame' realm until realistic dimensional and spatial relational inputs from real measurements in vivo during surgeries are added to an ever-growing statistical data archive. The challenges of managing and interpreting this 3-D data base, which would include radiographic and surface quantitative data, are considerable. As technology drives toward dynamic and continuous 3-D surface measurements, presenting millions of X, Y, Z data points per second of flexing, stretching, moving human organs, the knowledge base and interpretive capabilities of 'brilliant robots' to work as a surgeon's tireless assistants becomes imaginable. The brilliant robot would 'see' what the surgeon sees—and more, for the robot could quantify its 3-D sensing and would 'see' in a wider spectral range than humans, and could zoom its 'eyes' from the macro world to long-distance microscopy. Unerring robot hands could rapidly perform machine-aided suturing with precision micro-sewing machines, splice neural connections with laser welds, micro-bore through constricted vessels, and computer combine ultrasound, microradiography, and 3-D mini-borescopes to quickly assess and trace vascular problems in situ. The spatial relationships between organs, robotic arms, and end-effector diagnostic, manipulative, and surgical instruments would be constantly monitored by the robot 'brain' using inputs from its multiple 3-D quantitative 'eyes' remote sensing, as well as by contact and proximity force measuring devices. Methods to create accurate and quantitative 3-D topograms at continuous video data rates are described. Author (revised)

N94-33647*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
THE PORTABLE DYNAMIC FUNDUS INSTRUMENT: USES IN TELEMEDICINE AND RESEARCH Abstract Only
NORWOOD HUNTER (Krug Life Sciences, Inc., Houston, TX.), MICHAEL CAPUTO (Krug Life Sciences, Inc., Houston, TX.), ROGER BILLICA, GERALD TAYLOR, C. ROBERT GIBSON, F. KEITH MANUEL, THOMAS MADER, and RICHARD MEEHAN *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 555-556 Jan. 1994
Avail: CASI HC A01/MF A03

For years ophthalmic photographs have been used to track the progression of many ocular diseases such as macular degeneration and glaucoma as well as the ocular manifestations of diabetes, hypertension, and hypoxia. In 1987 a project was initiated at the Johnson Space Center (JSC) to develop a means of monitoring retinal vascular caliber and intracranial pressure during space flight. To conduct telemedicine during space flight operations, retinal images would require real-time transmissions from space. Film-based images would not be useful during in-flight operations. Video technology is beneficial in flight because the images may be acquired, recorded, and transmitted to the ground for rapid computer digital image processing and analysis. The computer analysis techniques developed for this project detected vessel caliber changes as small as 3 percent. In the field of telemedicine, the Portable Dynamic Fundus Instrument demonstrates the concept and utility of a small, self-contained video funduscope. It was used to record retinal images during the Gulf War and to transmit retinal images from the Space Shuttle Columbia during STS-50. There are plans to utilize this device to provide a mobile ophthalmic screening service in rural Texas. In the fall of 1993 a medical team in Boulder, Colorado, will transmit real-time images of the retina during remote consultation and diagnosis. The research applications of this device include the capability of operating in remote locations or small, confined test areas. There has been interest shown utilizing retinal imaging during high-G centrifuge tests, high-altitude chamber tests, and aircraft flight tests. A new design plan has been developed to incorporate the video instrumentation into face-mounted goggle. This design would eliminate head restraint devices, thus allowing full maneuverability to the subjects. Further development of software programs will broaden the application of the Portable Dynamic Fundus Instrument in telemedicine and medical research. Author

N94-33651*# Army Research Inst. of Environmental Medicine, Natick, MA. Environmental Physiology and Medical Directorate.
HYDRATION AND BLOOD VOLUME EFFECTS ON HUMAN THERMOREGULATION IN THE HEAT: SPACE APPLICATIONS

MICHAEL N. SAWKA, RICHARD R. GONZALEZ, and KENT B. PANDOLF *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 567-573 Jan. 1994
Avail: CASI HC A02/MF A03

Astronauts exposed to prolonged weightlessness will experience deconditioning, dehydration, and hypovolemia which all adversely affect thermoregulation. These thermoregulatory problems can be minimized by several countermeasures that manipulate body water and vascular volumes. USARIEM scientists have extensively studied dehydration effects and several possible countermeasures including hyperhydration, plasma and erythrocyte volume expansion. This paper reviews USARIEM research into these areas.
Author

N94-33708 Boston Univ., MA.
A SELF-ORGANIZING NEURAL NETWORK ARCHITECTURE FOR AUDITORY AND SPEECH PERCEPTION WITH APPLICATIONS TO ACOUSTIC AND OTHER TEMPORAL PREDICTION PROBLEMS Annual Report, 1 May 1992 - 30 Apr. 1993
STEPHEN GROSSBERG and MICHAEL COHEN Jan. 1994 13 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract F49620-92-J-0225)
(AD-A277526; AFOSR-94-0107TR) Avail: CASI HC A03

This project is developing autonomous neural network models for the real-time perception and production of acoustic and speech signals. A new acoustic filter was developed to show how coarticulated context-sensitive auditory signals can be separated and represented in a more context-independent fashion, thereby easing the recognition problem. Parallel processing streams sensitive to sustained and transient signals are used, as in vision. A model of working memory was developed that automatically compensates for variable acoustic or speech rates. The model shows how invariance of the short term storage of variable-rate acoustic streams can explain data about categorical boundary shifts when the distributions of silent intervals or of vowel durations are altered. New learning and categorization nets were shown to discriminate vowels with comparable accuracy but much higher compression than alternative methods. Models of skilled motor control were developed to clarify how speech and arm movements can be planned and flexibly modified by task requirements. Studies of neural oscillators suggest how rhythmic behaviors relevant to perception and action, notably synchronous oscillations, may be generated and controlled.
DTIC

N94-33779 Wright State Univ., Dayton, OH. Dept. of Psychology.
PATTERN ANALYSIS BASED MODELS OF MASKING BY SPATIALLY SEPARATED SOUND SOURCES Annual Progress Report, 15 May 1992 - 14 May 1993
ROBERT H. GILKEY 15 Jun. 1993 14 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract AF-AFOSR-0289-91) (AD-A277882; AFOSR-94-0137TR)
Avail: Issuing Activity (Defense Technical Information Center (DTIC))

Research is described in three areas: masked detection, sound localization, and neural network models of sound localization. Work on masked detection indicates that substantial reductions in masking of 8 to 18 dB can be realized when the signal is spatially separated from the masker in the free-field. This reduction in masking appears to be mediated by high-frequency information. Headphone-based studies of reproducible noise masking question traditional models of binaural masking, by showing unexpected relations between responses under monaural and binaural conditions. A new response technique was developed to support work on sound localization. Neural network models of sound localization based on binaural stimulus cues can produce responses comparable to those of human observers. Our efforts in laboratory development and in planning the Conference on Binaural and Spatial Hearing are also briefly described.
DTIC

N94-34005# Naval Medical Research and Development Command, Bethesda, MD.
A MODEL FOR PREDICTING CENTRAL NERVOUS SYSTEM TOXICITY FROM HYPERBARIC OXYGEN EXPOSURE IN MAN: EFFECTS OF IMMERSION, EXERCISE, AND OLD AND NEW DATA Technical Report, 1987 - 1994
A. L. HARABIN, S. S. SURVANSHI, and L. D. HOMER Mar. 1994 36 p
(AD-A278348; NMRI-94-0003) Avail: CASI HC A03/MF A01

We analyzed symptoms of central nervous system (CNS) oxygen toxicity from 1726 controlled human hyperbaric O2 exposures at PO2 (Partial pressure of O2) levels ranging from 0.3 to 2.9 atmospheres (atm) using risk models and maximum likelihood analysis, and tested specific hypotheses with likelihood ratios. The data were sorted into dry and immersed, no-exercise, and exercise conditions; new studies were separated from those before 1972. The analysis showed that CNS toxicity, in contrast to pulmonary, increases non-linearly with O2 level (power on O2 greater than 2) and time: the longer an exposure has been, the riskier additional exposure becomes (power on time greater than 1.2). Immersion and exercise each significantly increased the risk of toxicity at any PO2 and time combination. Older studies of immersed, exercised subjects predicted significantly more risk than new studies conducted under comparable conditions and could not be combined for parameter estimation. Reasons for this incompatibility are discussed. Parameters obtained from only the new data predict that current U.S. Navy depth/time limits for O2 diving should keep the incidence of O2 toxicity below 1%, provided recommended purging procedures are followed.
DTIC

N94-34025*# Dartmouth-Hitchcock Medical Center, Lebanon, NH.
***SURGERY APPLICATIONS OF VIRTUAL REALITY* Abstract Only**
JOSEPH ROSEN *In* NASA. Johnson Space Center, The Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 1 p 50 Jan. 1994
Avail: CASI HC A01/MF A04

Virtual reality is a computer-generated technology which allows information to be displayed in a simulated, bus lifelike, environment. In this simulated 'world', users can move and interact as if they were actually a part of that world. This new technology will be useful in many different fields, including the field of surgery. Virtual reality systems can be used to teach surgical anatomy, diagnose surgical problems, plan operations, simulate and perform surgical procedures (telesurgery), and predict the outcomes of surgery. The authors of this paper describe the basic components of a virtual reality surgical system. These components include: the virtual world, the virtual tools, the anatomical model, the software platform, the host computer, the interface, and the head-coupled display. In the chapter they also review the progress towards using virtual reality for surgical training, planning, telesurgery, and predicting outcomes. Finally, the authors present a training system being developed for the practice of new procedures in abdominal surgery.
Author

N94-34111 Oxford Univ. (England). Programming Research Group.
FORMAL DESIGN AND EVALUATION OF A VARIETY OF MEDICAL DIAGNOSTIC PROGRAMS
B. S. TODD and R. STAMPER 1993 145 p
(PB94-149622; PRG-109) Copyright Avail: Issuing Activity (National Technical Information Service (NTIS))

This monograph documents some experiments on computer-aided diagnosis carried out to investigate the effect on diagnostic accuracy of using various statistical and knowledge-based methods to take dependencies between clinical observations into account. The authors present detailed specifications of a variety of statistical and knowledge-based programs within a common formal framework using the Z specification language. They describe how they collected a retrospective database of 1270 cases of abdominal pain of suspected gynecological origin. They used this to evaluate all

methods. The results show that no significant improvement in accuracy can be made by taking interactions into account; independence Bayes is optimal in this application. However, the nearest neighbors method using a new metric appears to be at least as accurate. The authors argue that the nearest neighbors method is more suitable for clinical use than the direct application of independence Bayes because of improved accountability. The computer analysis is encoded and displayed to the user as a small set of actual cases that presented similarly to the new case. The user can retrieve these cases and inspect both their presentations and outcomes if he wishes. The ability to justify and support decisions in this way should be invaluable in safety-critical fields such as medical diagnosis. NTIS

N94-34602* National Aeronautics and Space Administration, Washington, DC.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 390)
Jul. 1994 53 p
(NASA-SP-7011(390); NAS 1.21:7011(390)) Avail: CASI HC A04

This bibliography lists 102 reports, articles, and other documents introduced into the NASA Scientific and Technical Information System. Subject coverage includes: life sciences (general), aerospace medicine, behavioral sciences, man/system technology and life support, and space biology. Author

N94-34695 Southwest Research Inst., San Antonio, TX.
EVALUATION OF PULSED DOPPLER BUBBLE DETECTION Final Report, 1 Oct. 1988 - 30 Sep. 1989
HEGEON KWUN, W. D. JOLLY, and D. G. ALCAZAR Mar. 1994 44 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract DLA900-84-C-0910; MIPR-FQ7624-89-000001; AF PROJ. 7930)
(AD-A277920; AL/CF-TP-1994-0006) Avail: CASI HC A03

The High Altitude Protection Function of the Crew Technology Division has used a portable Doppler array to monitor venous gas emboli in human research subjects exposed to reduced high altitudes. The existing Doppler equipment was limited in that subjects were required to maintain a specific body position to achieve consistent bubble grade analysis, especially during exercise. It was surmised that engineering modifications might resolve the dilemma. The target frequency and sound wave pulses were to be modified to maintain focus on the precordium allowing for continuous tracking of bubble sounds. A prototype, pulsed-wave, Doppler bubble detection instrument with transducers was designed and developed. This system demonstrated greater depth of penetration and the ability to localize the interrogation area; however, altitude simulation tests revealed the prototype to be unsatisfactory due to the high level of noise generated internally by the CW Doppler circuitry. Recommendations were made of redesign, but development was not pursued due to funding limitations. Also Doppler echo imaging was found to provide equal if not better analysis of bubble grades with the addition of visual cues to ensure accurate placement and timely monitoring regardless of physical activity. DTIC

53
BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N94-33595 New York Univ., New York. Dept. of Psychology.
VISUAL MOTION PERCEPTION AND VISUAL INFORMATION PROCESSING Annual Report, 1 Feb. 1992 - 31 Dec. 1993
GEORGE SPERLING 31 Dec. 1993 22 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract AF-AFOSR-0178-91)
(AD-A278530; AFOSR-94-0205TR) Avail: Issuing Activity (Defense Technical Information Center (DTIC))

This project concerned the discovery and description of basic mechanisms of human visual motion and texture perception. Motion and texture are critical inputs to visual perception. Basic mechanisms of motion are of particular interest because they are perhaps the primary substrate for perceptual recovery of 3D depth structures and orientation in space. They are critical for detecting new objects and events in the environment, as well as playing an important role in 2D perception. Motion and texture are considered together here because the problem of discriminating velocity in a one-dimensional motion stimulus is formally equivalent to the problem of discriminating orientation in a texture stimulus: the t dimension of the motion stimulus becomes the y dimension of the texture stimulus. DTIC

N94-33622*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
AUTOGENIC-FEEDBACK TRAINING IMPROVES PILOT PERFORMANCE DURING EMERGENCY FLYING CONDITIONS
MICHAEL A. KELLAR (Tripler Army Medical Center, Honolulu, HI.), RAYMOND A. FOLEN (Tripler Army Medical Center, Honolulu, HI.), PATRICIA S. COWINGS, WILLIAM B. TOSCANO, and GLEN L. HISERT *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 395-403 Jan. 1994 See also N93-27076
Avail: CASI HC A02/MF A03

Studies have shown that autonomous mode behavior is one cause of aircraft fatalities due to pilot error. In such cases, the pilot is in a high state of psychological and physiological arousal and tends to focus on one problem, while ignoring more critical information. This study examined the effect of training in physiological self-recognition and regulation, as a means of improving crew cockpit performance. Seventeen pilots were assigned to the treatment and control groups matched for accumulated flight hours. The treatment group comprised three pilots of HC-130 Hercules aircraft and four HH-65 Dolphin helicopter pilots; the control group comprised three pilots of HC-130's and six Dolphin helicopter pilots. During an initial flight, physiological data were recorded for each crew member and individual crew performance was rated by an instructor pilot. Eight crewmembers were then taught to regulate their own physiological response levels using Autogenic-Feedback Training (AFT). The remaining subjects received no training. During a second flight, treatment subjects showed significant improvement in performance, while controls did not improve. The results indicate that AFT management of high states of physiological arousal may improve pilot performance during emergency flying conditions.
Derived from text

N94-33623*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
IMPLEMENTING BRIGHT LIGHT TREATMENT FOR MSFC PAYLOAD OPERATIONS SHIFTWORKERS Abstract Only
BENITA C. HAYES, KAREN T. STEWART, and CHARMANE I. EASTMAN *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 404 Jan. 1994
Avail: CASI HC A01/MF A03

Intense light can phase-shift circadian rhythms and improve performance, sleep, and wellbeing during shiftwork simulations, but to date there have been very few attempts to administer light treatment to real shiftworkers. We have developed procedures for implementing light treatment and have conducted controlled trials of light treatment for MSFC Payload Operations staff during the USML-1 mission. We found that treatment had beneficial effects on fatigue, alertness, self-rated job performance, sleep, mood, and work attendance. Although there are portable bright light boxes commercially available, there is no testing protocol and little performance information available. We measure the illuminance of two candidate boxes for use in this study and found that levels were consistently lower

than those advertised by manufacturers. A device was developed to enhance the illuminance output of such units. This device increased the illuminance by at least 60 % and provided additional improvements in visual comfort and overall exposure. Both the design of this device and some suggested procedures for evaluating light devices are presented. Author (revised)

N94-33624*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
FLIGHT CONTROLLER ALERTNESS AND PERFORMANCE DURING MOD SHIFTWORK OPERATIONS
SEAN M. KELLY, MARK R. ROSEKIND, DAVID F. DINGES, DONNA L. MILLER, KELLY A. GILLEN, KEVIN B. GREGORY, RONALD D. AGUILAR, and ROY M. SMITH *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 405-416 Jan. 1994 Sponsored in part by Inst. for Experimental Psychiatry Research Foundation
(Contract NCC2-599)
Avail: CASI HC A03/MF A03

Decreased alertness and performance associated with fatigue, sleep loss, and circadian disruption are issues faced by a diverse range of shiftwork operations. During STS operations, MOD personnel provide 24 hr. coverage of critical tasks. A joint JSC and ARC project was undertaken to examine these issues in flight controllers during MOD shiftwork operations. An initial operational test of procedures and measures was conducted during STS-53 in Dec. 1992. The study measures included a background questionnaire, a subjective daily logbook completed on a 24 hr. basis (to report sleep patterns, work periods, etc.), and an 8 minute performance and mood test battery administered at the beginning, middle, and end of each shift period. Seventeen Flight controllers representing the 3 Orbit shifts participated. The initial results clearly support further data collection during other STS missions to document baseline levels of alertness and performance during MOD shiftwork operations. These issues are especially pertinent for the night shift operations and the acute phase advance required for the transition of day shift personnel into the night for shuttle launch. Implementation and evaluation of the countermeasure strategies to maximize alertness and performance is planned. As STS missions extend to further extended duration orbiters, timelines and planning for 24 circadian disruption will remain highly relevant in the MOD environment. Author (revised)

N94-33625*# Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA.
AUTOMATING THE TRAINING DEVELOPMENT PROCESS FOR MISSION FLIGHT OPERATIONS
CAROL J. SCOTT *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 417-425 Jan. 1994
Avail: CASI HC A02/MF A03

Traditional methods of developing training do not effectively support the changing needs of operational users in a multimission environment. The Automated Training Development System (ATDS) provides advantages over conventional methods in quality, quantity, turnaround, database maintenance, and focus on individualized instruction. The Operations System Training Group at the JPL performed a six-month study to assess the potential of ATDS to automate curriculum development and to generate and maintain course materials. To begin the study, the group acquired readily available hardware and participated in a two-week training session to introduce the process. ATDS is a building activity that combines training's traditional information-gathering with a hierarchical method for interleaving the elements. The program can be described fairly simply. A comprehensive list of candidate tasks determines the content of the database; from that database, selected critical tasks dictate which competencies of skill and knowledge to include in course material for the target audience. The training developer adds pertinent planning information about each task to the database, then ATDS generates a tailored set of instructional material, based on the specific set of selection criteria. Course material consistently leads students to a prescribed level of competency. Author (revised)

N94-33652*# Army Research Inst. of Environmental Medicine, Natick, MA. *Environmental Physiology and Medicine Directorate.*
PREDICTION MODELING OF PHYSIOLOGICAL RESPONSES AND HUMAN PERFORMANCE IN THE HEAT WITH APPLICATION TO SPACE OPERATIONS
KENT B. PANDOLF, LEANDER A. STROSCHEIN, RICHARD R. GONZALEZ, and MICHAEL N. SAWKA *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 574-581 Jan. 1994
Avail: CASI HC A02/MF A03

This institute has developed a comprehensive USARIEM heat strain model for predicting physiological responses and soldier performance in the heat which has been programmed for use by hand-held calculators, personal computers, and incorporated into the development of a heat strain decision aid. This model deals directly with five major inputs: the clothing worn, the physical work intensity, the state of heat acclimation, the ambient environment (air temperature, relative humidity, wind speed, and solar load), and the accepted heat casualty level. In addition to predicting rectal temperature, heart rate, and sweat loss given the above inputs, our model predicts the expected physical work/rest cycle, the maximum safe physical work time, the estimated recovery time from maximal physical work, and the drinking water requirements associated with each of these situations. This model provides heat injury risk management guidance based on thermal strain predictions from the user specified environmental conditions, soldier characteristics, clothing worn, and the physical work intensity. If heat transfer values for space operations' clothing are known, NASA can use this prediction model to help avoid undue heat strain in astronauts during space flight. Author (revised)

N94-33654*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
LA CHALUPA-30: LESSONS LEARNED FROM A 30-DAY SUBSEA MISSION ANALOGUE
STEVE VANDERARK (Krug Life Sciences, Inc., Houston, TX.), JOANNA WOOD (Krug Life Sciences, Inc., Houston, TX.), and ALBERT W. HOLLAND *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 584-595 Jan. 1994
Avail: CASI HC A03/MF A03

The Behavior and Performance Laboratory (BPL) utilizes space mission analogs to study issues such as the psychological health and well-being, team characteristics, and task performance of crew members on long-duration missions. The analog used in this investigation was an underwater habitat named La Chalupa, which was selected for its similar features to a space station environment. The primary objectives of the La Chalupa-30 investigation were to evaluate the efficiency of several methods for collecting data in remote environments and to assess aspects of living and working under isolated and confined conditions. Derived from text

N94-33674# Johns Hopkins Univ., Baltimore, MD. Dept. of Psychology.
STOCHASTIC MODELS OF ATTENTION AND SEARCH Annual Report, 1 Mar. 1993 - 28 Feb. 1994
STEVEN YANTIS 28 Feb. 1994 20 p
(Contract F49620-92-J-0186)
(AD-A278538; AFOSR-94-0247TR) Avail: CASI HC A03/MF A01

Six lines of experimentation have been continued. In the first set of experiments, the PI has tested and rejected a two-process model of visual attention allocation. He has proposed an alternative perceptual sampling model and performed stochastic simulations of the model to show that it can account for certain aspects of human performance in cued visual search tasks. In the second set of experiments, the PI has found evidence that observers perceive occluded objects across time, a finding that complements an

analogous ability to perceptually complete partially occluded objects across space. Several lines of experimentation have been carried our using a bistable apparent motion display (the Ternus display) as a tool to explore the assignment of object identity over time. For example, the PI has found evidence that a common mechanism may underlie the perception of bistable apparent motion and the capture of visual attention in certain visual search tasks, and he has discovered that perceptual grouping by proximity can precede the assignment of motion correspondences in bistable apparent motion. In the fifth project, the PI has shown that visual salience is not sufficient to produce attentional capture; a deliberate state of attentional readiness is required to guide attention according to salient stimulus attributes. DTIC

N94-33700 Rutgers - The State Univ., New Brunswick, NJ. Dept. of Psychology.
EYE MOVEMENTS AND VISUAL INFORMATION PROCESSING Annual Report, 30 Sep. 1992 - 29 Sep. 1993
EILEEN KOWLER 29 Sep. 1993 7 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract AF-AFOSR-0342-91)
(AD-A278364; AFOSR-94-0143TR) Avail: CASI HC A02

When we look around a natural environment the eye is directed toward objects we select. We seem to do this task accurately and effortlessly. Yet, even such a simple task presents real problems for the oculomotor system, namely, to select the relevant target from the detailed background so that only information contained in it influences the line of sight and to spatially pool information in the selected target so that the line of sight lands at a single position within the selected target. We have found that the saccadic target is designated by means of selective perceptual attention, which means people cannot prepare to look to one target while accurately perceiving targets elsewhere, and there is a highly-accurate spatial pooling process which can direct the line of sight to precise positions within large targets. The results show that the oculomotor system is capable of extremely rapid and effective scanning. The procedures humans use to accomplish this task may prove useful for the guidance of robotic systems which need to move about in patterned visual environments. DTIC

N94-33737 Symbus Technology, Inc., Waltham, MA.
WORKSHOP ON SELF-DETERMINATION IN DEVELOPING AND EVOLVING SYSTEMS Final Report, 15 Dec. 1993 - 14 Jan. 1994
MICHAEL KUPERSTEIN 18 Feb. 1994 63 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract F49620-94-C-0011)
(AD-A278367; AFOSR-94-0188TR) Avail: CASI HC A04

Self-determined systems are usually studied by researchers with unrelated terminology and few known common principles. This workshop was aimed at bringing together scientists whose research directly confronts the problems of analyzing, explaining, and building self-determined systems. We hoped that sharing their results and interpretations at the meeting would inspire cross pollination of ideas from different viewpoints and lead to a more unified approach and language to understanding self-determination. The workshop format and discussions were aimed at discovering underlying principles while amplifying little known links between scientific fields. The emphasis was on discovering tools and mechanisms that have general application to research problems in biology, neuroscience, psychology, and computer science. Fifteen researchers came together to explore these issues at Harvard University, January 6-9, 1994. Together, they brought their expertise from biology, neuroscience, developmental psychology, and computational modeling. DTIC

N94-33738 New York Univ., New York. Dept. of Psychology.
VISUAL MOTION PERCEPTION AND VISUAL INFORMATION PROCESSING Final Report, 1 Feb. 1991 - 31 Dec. 1993
GEORGE SPERLING 31 Dec. 1993 161 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract AF-AFOSR-0178-91)
(AD-A278370; AFOSR-94-0159TR)
Avail: Issuing Activity (Defense Technical Information Center (DTIC))

This final progress report summarizes the main recent results; full reports of the results are contained in the papers appended herewith. The summary also reviews some results from previous AFOSR grants where these are necessary to provide the background for the current research. Four areas are summarized: basic mechanisms of visual motion and texture perception; lateral interations in texture stimuli; information processing; and visual attention and short-term memory. DTIC

N94-33849 Boston Univ., MA. Center for Adaptive Systems.
THE COGNITIVE, PERCEPTUAL, AND NEURAL BASES OF SKILLED PERFORMANCE Final Report, 15 Mar. 1990 - 14 Mar. 1993
STEPHEN GROSSBERG Feb. 1994 88 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract AF-AFOSR-0175-90)
(AD-A277608; AFOSR-94-0067TR) Avail: Issuing Activity (Defense Technical Information Center (DTIC))

This three-year project partially supported three week-long international scientific meetings and courses on neural network research, 4 research books, more than 100 research articles, 68 Boston-area colloquia, 10 completed PhD theses, and the training of more than 20 graduate students. The research spanned a coordinated program of experimental and modeling studies of how the brain autonomously carries out intelligent behaviors in real-time in response to changing environmental contingencies. Neural models of 3-D vision and figure-around separation, motion perception, visual search, speech perception, working memories for storage of temporal sequences, supervised and unsupervised learning of recognition categories and predictions in response to nonstationary data, arm movement control, and quadruped gait transitions were developed. Technology transfers were made to processing of artificial sensor data, automatic target recognition, several industrial applications, and the control of mobile robots. DTIC

N94-33857 Boston Univ., MA.
NEURAL MODELS OF MOTION PERCEPTION Annual Technical Report, 1 Sep. 1992 - 31 Aug. 1993
STEPHEN GROSSBERG and ENNIO MINGOLLA 22 Feb. 1994 11 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract F49620-92-J-0334)
(AD-A278362; AFOSR-94-0142TR) Avail: CASI HC A03

Eight research projects supported by this grant during the reporting period have resulted in three refereed publications, one under review, one book chapter, and three conference papers. Areas of research included design and simulation of neural architectures for: multichannel data fusion; object recognition and image understanding; development and refinement of algorithms for segmentation, boundary completion, and featural filling-in based on BCS/FCS architectures; network design and simulations of an architecture for breaking of unwanted persistence (hysteresis) of visual segmentations; design of a network architecture for explaining human capabilities for efficient detection of targets in clutter; design and execution of human psychophysical experiments for constraining development of the BCS; design and simulation of a network architecture for enhancing featural contrast and boundary localization at line-ends and corners through a novel circuit analog of VI to lateral geniculate nucleus feedback; and relation of hyperacuity and illusory contour data. DTIC

N94-34024*# Houston Univ., TX.
SHARED VIRTUAL ENVIRONMENTS FOR AEROSPACE TRAINING Abstract Only
R. BOWEN LOFTIN and MARK VOSS *In* NASA. Johnson Space Center, The Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 1 p 49 Jan. 1994
Avail: CASI HC A01/MF A04

Virtual environments have the potential to significantly enhance the training of NASA astronauts and ground-based personnel for a variety of activities. A critical requirement is the need to share virtual environments, in real or near real time, between remote sites. It has been hypothesized that the training of international astronaut crews could be done more cheaply and effectively by utilizing such shared virtual environments in the early stages of mission preparation. The Software Technology Branch at NASA's Johnson Space Center has developed the capability for multiple users to simultaneously share the same virtual environment. Each user generates the graphics needed to create the virtual environment. All changes of object position and state are communicated to all users so that each virtual environment maintains its 'currency.' Examples of these shared environments will be discussed and plans for the utilization of the Department of Defense's Distributed Interactive Simulation (DIS) protocols for shared virtual environments will be presented. Finally, the impact of this technology on training and education in general will be explored. Author

N94-34044*# California Univ., Irvine, CA. Department of Information and Computer Science.
FINDING ACCURATE FRONTIERS: A KNOWLEDGE-INTENSIVE APPROACH TO RELATIONAL LEARNING
MICHAEL PAZZANI and CLIFFORD BRUNK *In* NASA. Johnson Space Center, The Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 1 p 187-193 Jan. 1994
Avail: CASI HC A02/MF A04

An approach to analytic learning is described that searches for accurate entailments of a Horn Clause domain theory. A hill-climbing search, guided by an information based evaluation function, is performed by applying a set of operators that derive frontiers from domain theories. The analytic learning system is one component of a multi-strategy relational learning system. We compare the accuracy of concepts learned with this analytic strategy to concepts learned with an analytic strategy that operationalizes the domain theory. Author

N94-34045*# Oregon State Univ., Corvallis. Dept. of Computer Science.
REINFORCEMENT LEARNING IN SCHEDULING
TOM G. DIETTERICH, DOKYEONG OK, WEI ZHANG, and PRASAD TADEPALLI *In* NASA. Johnson Space Center, The Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 1 p 194-199 Jan. 1994
(Contract NAGW-1293)
Avail: CASI HC A02/MF A04

The goal of this research is to apply reinforcement learning methods to real-world problems like scheduling. In this preliminary paper, we show that learning to solve scheduling problems such as the Space Shuttle Payload Processing and the Automatic Guided Vehicle (AGV) scheduling can be usefully studied in the reinforcement learning framework. We discuss some of the special challenges posed by the scheduling domain to these methods and propose some possible solutions we plan to implement. Author

N94-34108 National Defence Research Establishment, Stockholm (Sweden). Huvudavdelning foer Maensklig Prestation och Funktion.
CRISIS AND DISASTER RESEARCH: A REVIEW [PROGRAMUTREDNING: KRIS- OCH KATASTROFFORSKNING]
A. ENDANDER, G. LARSSON, and C. WALLENIUS Nov. 1993 94 p In SWEDISH
(PB94-149234; FOA-A-50018-5.3) Avail: Issuing Activity (National Technical Information Service (NTIS))

The study focuses primarily on individual responses of relevance prior to, during, and immediately after a crisis/disaster event requiring societal or community action. The report comprises four sections: In Section 1 the need for a framework for reviewing the area of disaster research is discussed in relation to three basic problem areas. These concern: similarities and differences between different types of disaster events, the relationship between an event and the individual's subjective interpretation of the event, and finally the issue of classifying human reactions as adaptive or nonadaptive in relation to different criteria. Section 2 focuses on description and analysis of individual reactions in disaster situations. The concepts of appraisal and coping are discussed and applied to disaster situations. In Section 3 empirical studies concerning individual reactions are reviewed in relation to different societal or community responses in dealing with crises/disasters. Four main phases are discussed: prevention and general preparedness, warning and preparation for an identified threat, ways of coping in an actual crisis, and finally the recovery phase. Section 4 provides a discussion of empirical knowledge in disaster research in relation to specifically Swedish conditions. NTIS

N94-34210# Federal Aviation Administration, Oklahoma City, OK. Civil Aeromedical Inst.
VALIDITY OF THE AIR TRAFFIC CONTROL SPECIALIST NONRADAR SCREEN AS A PREDICTOR OF PERFORMANCE IN RADAR-BASED AIR TRAFFIC CONTROL TRAINING Final Report
DANA BROACH and CAROL A. MANNING Apr. 1994 13 p
(DOT/FAA/AM-94/9) Avail: CASI HC A03/MF A01

Between January 1986 and March 1992, the Federal Aviation Administration's 42-day Nonradar Screen was used to identify Air Traffic Control Specialist (ATCS) candidates with the highest potential to succeed in the rigorous ATCS field training program. The central question addressed in this study was whether or not the Nonradar Screen was a valid employee selection procedure in view of the prevalence of radar in today's air traffic control system. To answer that question, we investigated the Nonradar Screen's criterion-related validity as a predictor of subsequent performance in radar-based air traffic control training. We hypothesized that the Nonradar Screen would add incremental validity over aptitude test scores in predicting performance in radar-based air traffic control (ATC) training conducted at the FAA Academy 1 to 2 years after entry into the occupation. Student aptitude test scores and Nonradar Screen final composite scores were regressed on final composite scores earned in radar-based ATC training. Results showed that Nonradar Screen composite scores had incremental validity over the written ATCS aptitude test for predicting radar-based training scores in both en route (Delta R(exp 2) = .08, F(2,438) = 36.52, p less than or equal to .001) and terminal (R(exp 2)= 10, F(2,658) = 77.66, p less than or equal to .001) radar training without correcting for range restriction due to explicit selection on the Nonradar Screen final composite score. After corrections for restriction in range, Nonradar Screen scores accounted for an additional 20 percent of variance in en route (Delta R(exp 2) = .20, F = 146.84, p less than or equal to .001) and an additional 16 percent of variance in terminal (R(exp 2) = .16, F = 178.58, p less than or equal to .001) radar training scores. These results indicated that the Nonradar Screen was a valid predictor of performance in radar-based ATC training. Similarities in nonradar and radar procedures and techniques are offered as possible explanations for the finding of criterion-related validity for the ATCS Nonradar Screen. Author

N94-34699# Helsinki Univ. of Technology, Espoo (Finland). Power Systems and Illumination Engineering Lab.
EFFECTS OF LIGHTING AND TASK PARAMETERS ON VISUAL ACUITY AND PERFORMANCE Ph.D. Thesis
LIISA HALONEN 1993 170 p Sponsored in part by Ministry of

Trade and Industry, Academy of Finland, Finnish Work Environment Fund, and National Board of Public Building
(ISSN 1235-8495)
(ISBN-9-51-221845-3; ETN-94-96054) Avail: CASI HC A08/MF A02

Lighting and task parameters and their effects on visual acuity and visual performance are discussed. The parameters studied are target contrast, target size, and subject's age; adaptation luminance, luminance ratio between the task and its surroundings, and temporal change in luminances are also studied. Experiments were carried out to examine the effects of luminance and light spectrum on visual acuity. Young normally sighted, older, and low vision people participated in the measurements. On the basis of the visual acuity experiments, a three dimensional visual acuity model (VAHUT) was developed. The model predicts visual acuity as a function of luminance, target contrast and observer age. On the basis of visual acuity experiments visual acuity reserve values were calculated for different text sizes. Luminance measurements were carried out in an office room with and without daylight. When the lighting or task parameters are near the threshold values, a very small increase in the values improves performance. However, when the values are above a certain value there is unlikely to be any significant improvements in visual acuity or visual performance. ESA

54
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N94-33589 Serv-Air, Inc., Lexington, KY.
INTEGRATION OF THE MOLECULAR SIEVE OXYGEN GENERATING SYSTEM (MSOGS) INTO THE UH-60Q MEDEVAC BLACKHAWK Final Report, 24 Aug. 1992 - 30 May 1993
JOHN HIGHT and ORLANDO CORDERO-MONTALVO 11 Mar. 1994 54 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract MIPR-92MM2594; DA PROJ. 3O4-63807-D-836)
(AD-A277668) Avail: CASI HC A04

A Molecular Sieve Oxygen Generated System (MSOGS) was integrated in the UH-60Q Medevac Helicopter as part of the requirements of this program. Support equipment for the system operation was also integrated in this effort. Problems such as intake air flow cooling and moisture build-up were addressed. Functional and performance tests were conducted by personnel from United States Army Aeromedical Research Laboratory. As a result of the integration effort a more simple and efficient method of installing the MSOGS unit and its supporting systems will be developed. Emphasis will be on the servicing of the oxygen lines on the field to make the system user friendly. DTIC

N94-33608*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
AN ETHNOGRAPHIC OBJECT-ORIENTED ANALYSIS OF EXPLORER PRESENCE IN A VOLCANIC TERRAIN ENVIRONMENT: CLAIMS AND EVIDENCE
MICHAEL W. MCGREEVY May 1994 57 p
(Contract RTOP 506-59-65)
(NASA-TM-108823; A-94083; NAS 1.15:108823) Avail: CASI HC A04/MF A01

An ethnographic field study was conducted to investigate the nature of presence in field geology, and to develop specifications for domain-based planetary exploration systems utilizing virtual presence. Two planetary geologists were accompanied on a multi-day geologic field trip that they had arranged for their own scientific purposes, which centered on an investigation of the extraordinary xenolith/nodule deposits in the Kaupulehu lava flow of Hualalai Volcano, on the island of Hawaii. The geologists were observed during the course of their field investigations and interviewed regarding their activities and ideas. Analysis of the interview resulted in the identification of key domain entities and their attributes, relations among the entities, and explorer interactions with the environment. The results support and extend the author's previously reported continuity theory of presence, indicating that presence in field geology is characterized by persistent engagement with objects associated by metonymic relations. The results also provide design specifications for virtual planetary exploration systems, including an integrating structure for disparate data integration. Finally, the results suggest that unobtrusive participant observation coupled with field interviews is an effective research methodology for engineering ethnography. Author

N94-33613*# Brookhaven National Lab., Upton, NY. Human Factors and Performance Analysis Group.
HFE SAFETY REVIEWS OF ADVANCED NUCLEAR POWER PLANT CONTROL ROOMS
JOHN OHARA *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 329-336 Jan. 1994 Sponsored by Nuclear Regulatory Commission
Avail: CASI HC A02/MF A03

Advanced control rooms (ACR's) will utilize human-system interface (HSI) technologies that may have significant implications for plant safety in that they will affect the operator's overall role and means of interacting with the system. The Nuclear Regulatory Commission (NRC) reviews the human factors engineering (HFE) aspects of HSI's to ensure that they are designed to good HFE principles and support performance and reliability in order to protect public health and safety. However, the only available NRC guidance was developed more than ten years ago, and does not adequately address the human performance issues and technology changes associated with ACR's. Accordingly, a new approach to ACR safety reviews was developed based upon the concept of 'convergent validity'. This approach to ACR safety reviews is described.
Author (revised)

N94-33619*# Aerospace Medical Research Labs., Wright-Patterson AFB, OH. Human Engineering Div.
FUSION INTERFACES FOR TACTICAL ENVIRONMENTS: AN APPLICATION OF VIRTUAL REALITY TECHNOLOGY
MICHAEL W. HAAS *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 378-387 Jan. 1994
Avail: CASI HC A02/MF A03

The term Fusion Interface is defined as a class of interface which integrally incorporates both virtual and nonvirtual concepts and devices across the visual, auditory, and haptic sensory modalities. A fusion interface is a multisensory virtually-augmented synthetic environment. A new facility has been developed within the Human Engineering Division of the Armstrong Laboratory dedicated to exploratory development of fusion interface concepts. This new facility, the Fusion Interfaces for Tactical Environments (FITE) Facility is a specialized flight simulator enabling efficient concept development through rapid prototyping and direct experience of new fusion concepts. The FITE Facility also supports evaluation of fusion concepts by operation fighter pilots in an air combat environment. The facility is utilized by a multidisciplinary design team composed of human factors engineers, electronics engineers, computer scientists, experimental psychologists, and oeprational pilots. The FITE computational architecture is composed of twenty-five 80486-based microcomputers operating in real-time. The microcomputers generate out-the-window visuals, in-cockpit and head-mounted visuals, localized auditory presentations, haptic displays on the stick and rudder pedals, as well as executing weapons models, aerodynamic models, and threat models. Author (revised)

N94-33620*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
VIRTUAL REALITY AS A HUMAN FACTORS DESIGN ANALYSIS TOOL: MACRO-ERGONOMIC APPLICATION VALIDATION AND ASSESSMENT OF THE SPACE STATION FREEDOM PAYLOAD CONTROL AREA Abstract Only
JOSEPH P. HALE *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 388 Jan. 1994
Avail: CASI HC A01/MF A03

A virtual reality (VR) Applications Program has been under development at MSFC since 1989. Its objectives are to develop, assess, validate, and utilize VR in hardware development, operations development and support, missions operations training, and science training. A variety of activities are under way within many of these areas. One ongoing macro-ergonomic application of VR relates to the design of the Space Station Freedom Payload Control Area (PCA), the control room from which onboard payload operations are managed. Several preliminary conceptual PCA layouts have been developed and modeled in VR. Various managers and potential end users have virtually 'entered' these rooms and provided valuable feedback. Before VR can be used with confidence in a particular application, it must be validated, or calibrated, for that class of applications. Two associated validation studies for macro-ergonomic applications are under way to help characterize possible distortions of filtering of relevant perceptions in a virtual world. In both studies, existing control rooms and their 'virtual counterparts will be empirically compared using distance and heading estimations to objects and subjective assessments. Approaches and findings of the PCA activities and details of the studies are presented. Author (revised)

N94-33621*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
A RAPID ALGORITHM FOR REALISTIC HUMAN REACHING AND ITS USE IN A VIRTUAL REALITY SYSTEM
ANN ALDRIDGE (Lockheed Engineering and Sciences Co., Houston, TX.), ABHILASH PANDYA (Lockheed Engineering and Sciences Co., Houston, TX.), MICHAEL GOLDSBY (Lockheed Engineering and Sciences Co., Houston, TX.), and JAMES MAIDA In its Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 389-394 Jan. 1994
Avail: CASI HC A02/MF A03

The Graphics Analysis Facility (GRAF) at JSC has developed a rapid algorithm for computing realistic human reaching. The algorithm was applied to GRAF's anthropometrically correct human model and used in a 3D computer graphics system and a virtual reality system. The nature of the algorithm and its uses are discussed. Author

N94-33627*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
TASK NETWORK MODELS IN THE PREDICTION OF WORKLOAD IMPOSED BY EXTRAVEHICULAR ACTIVITIES DURING THE HUBBLE SPACE TELESCOPE SERVICING MISSION
MANUEL F. DIAZ (Lockheed Engineering and Sciences Co., Houston, TX.), NEAL TAKAMOTO (Air Force Systems Command, Brooks AFB, TX.), and BARBARA WOOLFORD *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 432-436 Jan. 1994
Avail: CASI HC A01/MF A03

In a joint effort with Brooks AFB, Texas, the Flight Crew Support Division at JSC has begun a computer simulation and performance modeling program directed at establishing the predictive validity of software tools for modeling human performance during spaceflight. This paper addresses the utility of task network modeling for predicting the workload that astronauts are likely to encounter in extravehicular activities (EVA) during the Hubble Space Telescope (HST) repair mission. The intent of the study was to determine whether two EVA crewmembers and one intravehicular activity (IVA) crewmember could reasonably be expected to complete HST Wide Field/Planetary Camera (WFPC) replacement in the allotted time. Ultimately, examination of the points during HST servicing that may result in excessive workload will lead to recommendations to the HST Flight Systems and Servicing Project concerning (1) expectation of degraded performance, (2) the need to change task allocation across crewmembers, (3) the need to expand the timeline, and (4) the need to increase the number of EVA's. Author (revised)

N94-33628*# Aerospace Medical Research Labs., Wright-Patterson AFB, OH.
A HUMAN FACTORS EVALUATION USING TOOLS FOR AUTOMATED KNOWLEDGE ENGINEERING
MARIE E. GOMES and STEPHANIE LIND *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 437-441 Jan. 1994
Avail: CASI HC A01/MF A03

A human factors evaluation of the MH-53J helicopter cockpit is described. This evaluation was an application and futher development of Tools for Automated Knowledge Engineering (TAKE). TAKE is used to acquire and analyze knowledge from domain experts (aircrew members, system designers, maintenance personnel, human factors engineers, or others). TAKE was successfully utilized for the purpose of recommending improvements for the man-machine interfaces (MMI) in the MH-53J cockpit. Author (revised)

N94-33629*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
AN OVERVIEW OF SPACE SHUTTLE ANTHROPOMETRY AND BIOMECHANICS RESEARCH WITH EMPHASIS ON STS/MIR RECUMBENT SEAT SYSTEM DESIGN
GLENN K. KLUTE and LARA E. STOYCOS *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 442-446 Jan. 1994
Avail: CASI HC A01/MF A03

The Anthropometry and Biomechanics Laboratory (ABL) at JSC conducts multi-disciplinary research focusing on maximizing astronaut intravehicular (IVA) and extravehicular (EVA) capabilities to provide the most effective work conditions for manned space flight and exploration missions. Biomechanics involves the measurement and modeling of the strength characteristics of the human body. Current research for the Space Shuttle Program includes the measurement of torque wrench capability during weightlessness, optimization of foot restraint, and hand hold placement, measurements of the strength and dexterity of the pressure gloved hand to improve glove design, quantification of the ability to move and manipulate heavy masses (6672 N or 1500 lb) in weightlessness, and verification of the capability of EVA crewmembers to perform Hubble Space Telescope repair tasks. Anthropometry is the measurement and modeling of the dimensions of the human body. Current research for the Space Shuttle Program includes the measurement of 14 anthropometric parameters of every astronaut candidate, identification of EVA finger entrapment hazards by measuring the dimensions of the gloved hand, definition of flight deck reach envelopes during launch and landing accelerations, and measurement of anthropometric design parameters for the recumbent seat system required for the Shuttle/Mir mission (STS-71, Spacelab M) scheduled for Jun. 1995. Author (revised)

N94-33630*# Aerospace Medical Research Labs., Wright-Patterson AFB, OH. Human Engineering Div.
ANTHROPOMETRIC ACCOMMODATION IN USAF COCKPITS
GREGORY F. ZEHNER *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 447-459 Jan. 1994
Avail: CASI HC A03/MF A03

Over the past three years, a new set of methodologies has been developed to specify and evaluate anthropometric accommodation in USAF crewstation designs. These techniques are used to improve the ability of the pilot to reach controls, to safely escape the aircraft,

to achieve adequate mobility and comfort, and to assure full access to the visual field both inside and outside the aircraft. This paper summarized commonly encountered aircraft accommodation problems, explains the failure of the traditional 'percentile man' design concept to resolve these difficulties, and suggests an alternative approach for improving cockpit design to better accommodate today's more heterogeneous flying population. Author (revised)

N94-33634*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
A COMPARISON OF PAPER AND COMPUTER PROCEDURES IN A SHUTTLE FLIGHT ENVIRONMENT
MICHAEL ONEAL (Lockheed Engineering and Sciences Co., Houston, TX.), KRITINA HOLDEN (Lockheed Engineering and Sciences Co., Houston, TX.), STEVE WOLF (Lockheed Engineering and Sciences Co., Houston, TX.), and FRANCES MOUNT *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 483-491 Jan. 1994
Avail: CASI HC A02/MF A03

The Electronic Procedures Experiment (EPROC) was flown as part of the Human Factors Assessment (HFA) experiment aboard the SpaceHab-1/STS-57 mission. EPROC is concerned with future, longer-duration missions which will increasingly rely on electronic procedures since they are more easily launched, updated in-flight, and offer automatic or on-request capabilities not available with paper. A computer-based task simulating a Space Station Propulsion System task was completed by one crewmember. The crewmember performed the task once using paper and once using computer procedures. A soldering and desoldering task was performed by another crewmember. Soldering was completed with paper procedures and desoldering was completed using computer procedures. Objective data was collected during each task session from the computer programs, videotapes, and crew notations in the paper and computer procedures. After each task session, subjective data was collected through the use of a computer-based questionnaire program. Resultant recommendations will be made available to future designers of electronic procedures systems for manned-space missions and other related uses. Author (revised)

N94-33635*# Aerospace Medical Research Labs., Brooks AFB, TX.
GRAVITY, THE THIRD DIMENSION OF LIFE SUPPORT IN SPACE Abstract Only
RUSSELL R. BURTON *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 493 Jan. 1994
Avail: CASI HC A01/MF A03

The ascent of the human into high altitudes required a 2-D life support system that supplied: oxygen, and heat. At lower altitudes, increased oxygen concentration in the inhaled gases was useful, but at higher altitudes for longer durations, this 'clever' life support approach was no longer adequate—physiologic requirements had to provide a natural pressure-based environment. In space, the life support system requires a third dimension, gravity. Although substituting for gravity has been successful on a limited number of physiologic functions for short-duration stays in space, long durations will require the effects of the real thing for critical physiologic functions. It has been known for over a hundred years that the forces of acceleration (G) and gravity are equivalent. Therefore, gravitational stimulation in space can be achieved with centrifugation. However, for this stimulation to be effective, the dosage of G required to maintain normal physiologic function must be determined. An approximation of this dosage of G for the human can be determined with 3-day bed-rest studies including periodic centrifuge exposure. Recent research on this topic is reviewed.
Author (revised)

N94-33636*# Naval Air Warfare Center, Warminster, PA.
THE US NAVY/CANADIAN DCIEM RESEARCH INITIATIVE ON PRESSURE BREATHING PHYSIOLOGY Abstract Only
PHILLIP E. WHITLEY *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 494 Jan. 1994
Avail: CASI HC A01/MF A03

Development of improved positive pressure breathing garments for altitude and acceleration protection has occurred without collection of sufficient physiological data to understand the mechanisms of the improvement. Furthermore, modeling of the predicted response of future enhanced garments is greatly hampered by this lack of information. A joint, international effort is under way between Canada's Defense and Civil Institute for Environmental Medicine (DCIEM) and the US Navy's Naval Air Warfare Center Aircraft Division, Warminster (NAWCACDIVWAR). Using a Canadian subject pool, experiments at both the DCIEM altitude facility and the NAWCADIVWAR Dynamic Flight Simulator have been conducted to determine the cardiovascular and respiratory consequences of high levels of positive pressure breathing for altitude and positive pressure breathing for acceleration protection. Various improved pressure breathing garments were used to collect comparative physiological and performance data. New pressure breathing level and durahon capabilities have been encountered. Further studies will address further improvements in pressure suit design and correlation of altitude and acceleration data. Author (revised)

N94-33642*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
TOTAL HYDROCARBON ANALYSIS BY ION MOBILITY SPECTROMETRY
JOHN H. CROSS (Krug Life Sciences, Inc., Houston, TX.), THOMAS F. LIMERO (Krug Life Sciences, Inc., Houston, TX.), and JOHN T. JAMES *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 522-531 Jan. 1994
Avail: CASI HC A02/MF A03

Astronauts must be alerted quickly to chemical leaks that compromise their health and the success of their missions. An ideal leak detector would be equally sensitive to all compounds that might constitute a hazard and insensitive to nontoxic compounds. No ideal sensor exists; thus, selection of a methodology is a series of compromises. The commonly used methods are either insensitive at the low exposure levels set by OSHA, NASA, and other organizations or are selectively insensitive to important classes of chemicals such as Freons. After extensive study and experience, the Toxicology Group at JSC has selected ion mobility spectrometry (IMS) for development into a broad range, sensitive detector. In addition to the sensing method, signal processing is important leak detection because a background signal can be expected at all times. The leak-detecting instrument must be programmed to discriminate between authentic leaks and background fluctuations caused by routine operations. The results of an evaluation of the prototype THA is presented in terms related to spacecraft operations. The evaluation included determination of instrumental parameters such as stability and response times. We also included responses to some common components of spacecraft atmospheres in pure form and in binary and ternary mixtures. The output of the four algorithms to the mixtures was found to be noticeably different. These responses are compared on the basis of their utility for signaling a chemical leak. As a means of evaluating its resistance to a falsely positive response, the THA was challenged with carbon dioxide and methane, compounds whose concentrations normally increase in spacecraft air during human habitation. The instrument showed virtually no response to these interferences. Although the prototype THA is designed for space flight, this detector is expected to be useful for field screening at chemical waste dumps and other environmentally sensitive locations. Author (revised)

N94-33649*# Aerospace Medical Research Labs., Brooks AFB, TX.
PERSONAL COOLING SYSTEMS: POSSIBILITIES AND LIMITATIONS Abstract Only
SARAH A. NUNNELEY *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research

(SOAR 1993), Volume 2 p 559 Jan. 1994
Avail: CASI HC A01/MF A03

Personal thermal control by means of gas- or liquid-conditioned garments was developed during the 1960s and has been applied in a variety of aerospace and industrial settings. Both USAF fighter pilots and astronauts are required to wear heavy protective clothing which insulates them from the environment and thus creates stress through storage of metabolic heat. The problem is particularly severe in astronauts who perform heavy physical work during extra-vehicular activity (EVA); without artificial cooling they could reach incapacitating hyperthermia in a matter of minutes. This paper reviews the factors which influence the design of personal cooling systems. An important early step is determination of acceptable heat stress level, taking into account possible interactions of heat stress with other physiological problems such as motion sickness, diminished plasma volume, decompression sickness and acceleration tolerance. Other factors which require consideration include the work schedule, the area to be covered by the cooling garment, and the practicalities of a fixed or body-mounted heat sink and its power source. Nearly every imaginable heat sink has been proposed or tried over the past 30 years, including direct gas systems, phase-change systems with open or closed loops and thermoelectric heat sinks. The latter are now the system of choice for aircraft. Author

N94-33650*# Army Research Inst. of Environmental Medicine, Natick, MA. Biophysics and Biomedical Modeling Div.
MODELING HEAT EXCHANGE CHARACTERISTICS OF LONG TERM SPACE OPERATIONS: ROLE OF SKIN WETTEDNESS AND EXERCISE
RICHARD R. GONZALEZ *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 560-566 Jan. 1994
Avail: CASI HC A02/MF A03

The problems of heat exchange during rest and exercise during long term space operations are covered in this report. Particular attention is given to the modeling and description of the consequences of requirement to exercise in a zero-g atmosphere during Space Shuttle flights, especially long term ones. In space environments, there exists no free convection therefore only forced convection occurring by movement, such as pedalling on a cycle ergometer, augments required heat dissipation necessary to regulate body temperature. The requirement to exercise at discrete periods of the day is good practice in order to resist the deleterious consequences of zero-gravity problems and improve distribution of body fluids. However, during exercise (ca. 180 to 250W), in zero-g environments, the mass of eccrine sweating rests as sheets on the skin surface and the sweat cannot evaporate readily. The use of exercise suits with fabrics that have hydrophobic or outwicking properties somewhat distributes the mass of sweat to a larger surface from which to evaporate. However, with no free convection, increased skin wettedness throughout the body surface induces increasing thermal discomfort, particularly during continuous exercise. This report presents several alternatives to aid in this problem: use of intermittent exercise, methods to quantify local skin wettedness, and introduction of a new effective temperature that integrates thermal stress and heat exchange avenues in a zero-g atmosphere. Author

N94-33653*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
EVALUATION OF A LIQUID COOLING GARMENT AS A COMPONENT OF THE LAUNCH AND ENTRY SUIT (LES) Abstract Only
J. WALIGORA, J. CHARLES, I. FRITSCH, S. FORTNEY, S. SICONOLFI, L. PEPPER, L. BAGIAN, and V. KUMAR *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 583 Jan. 1994
Avail: CASI HC A01/MF A03

The LES is a partial pressure suit and a component of the shuttle life support system used during launch and reentry. The LES relies on gas ventilation with cabin air to provide cooling. There are conditions during nominal launch and reentry, landing, and post-landing phases when cabin temperature is elevated. Under these conditions, gas cooling may result in some discomfort and some decrement in orthostatic tolerance. There are emergency conditions involving loss of cabin ECS capability that would challenge crew thermal tolerance. The results of a series of tests are presented. These tests were conducted to assess the effectiveness of a liquid-cooled garment in alleviating thermal discomfort, orthostatic intolerance, and thermal intolerance during simulated mission phases. Author

N94-33655*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
COMPARATIVE PERFORMANCE OF A MODIFIED SPACE SHUTTLE REENTRY ANTI-G SUIT (REAGS) WITH AND WITHOUT PRESSURE SOCKS Abstract Only
R. W. KRUTZ, JR. (Krug Life Sciences, Inc., Houston, TX.), G. L. RIPLEY (Krug Life Sciences, Inc., Houston, TX.), J. A. MARSHALL (Aerospace Medical Research Labs., Brooks AFB, TX.), and C. F. SAWIN *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 596 Jan. 1994
Avail: CASI HC A01/MF A03

In a prior study, the Armstrong Laboratory (AL) demonstrated that +G(sub z) protection during simulated shuttle reentry could be improved with an extended coverage anti-G suit with pressure socks but no abdominal bladder (REAGS). In a subsequent study conducted at the NASA Johnson Space Center it was shown that REAGS had a down side which included restricted mobility (during simulated shuttle egress) and a larger boot size needed for the pressure socks. The present study was conducted using a modified REAGS to increase mobility during egress. The size of the crotch opening was increased, and the fabric covering the buttocks was replaced with more elastic material. Six healthy male members of the AL centrifuge panel served as subjects for the study. As in the earlier study, subjects received 20 to 35 mg of IV Lasix approximately 6 hours before being exposed to a simulated space shuttle reentry +G(sub z) profile on the AL centrifuge, which induced a mean weight loss of 2.8 percent, range 2.1 percent to 3.7 percent. The REAGS was inflated to 1.0 psig 10 minutes prior to G onset. The G-profile was identical to that used in the previous REAGS study. Physiologic parameters monitored were also the same, i.e., eye-level systolic blood pressure (ELBP) using the Finapres digital cuff technique and heart rate and rhythm. Subjective comments were obtained from questionnaires administered after the increased G exposure. Systolic ELBP was maintained at 60 mm Hg or above by pressurizing the anti-G suit in 0.5 psig increments up to a maximum pressure of 2.5 psig. There were no significant differences in mean G-suit pressure required to maintain systolic ELBP at 60 mm Hg or above between the REAGS worn with and without pressure socks. Maximum mean G-levels achieved during the GOR were also the same under both experimental conditions, i.e., 4.7 G with socks and 4.6 G without socks. These G-levels were essentially the same as recorded earlier with the unmodified REAGS. There were no significant differences in comfort rating during the G exposure assigned by subjects when they wore the modified REAGS with or without the pressure socks. Author (revised)

N94-33656*# Aerospace Medical Research Labs., Brooks AFB, TX.
CURRENT AND FUTURE ISSUES IN USAF FULL PRESSURE SUIT RESEARCH AND DEVELOPMENT Abstract Only
TERRELL E. SCOGGINS *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 597 Jan. 1994
Avail: CASI HC A01/MF A03

Although the full pressure suits currently in the USAF operational inventory provide acceptable performance and crew protection for these missions, there is considerable room for improvement, especially in the areas of comfort, mobility, glove and helmet

performance, and maintenance/supportability. As future aircraft push the envelope towards operations at higher and higher altitudes and transatmospheric flight, advances in full pressure suit technology will be needed. Also, enhanced pressure suit technology will be required to meet NASA's need for protection during future EVA operations for both on-orbit and planetary surface missions. This presentation will review the results of efforts at the Armstrong Laboratory to develop and demonstrate advanced full pressure suit technology for use in future high-altitude reconnaissance aircraft and transatmospheric vehicle operations. For those readers who may not be familiar with this area of life support equipment, a brief review of the important physiological and operational requirements for full pressure suits used in these applications will be addressed first, followed by a summary of the current state-of-the-art in USAF pressure suit technology. Ongoing and recently completed work on enhanced mobility pressure suit joints and improved pressure suit gloves will then be reviewed. The presentation will conclude with discussion of the technical challenges for successful development of an advanced full pressure suit for aerospace operations in the 21st century. Author (revised)

N94-33657*# Naval Air Warfare Center, Warminster, PA.
ADVANCED INTEGRATED LIFE SUPPORT SYSTEM UPDATE Abstract Only
PHILLIP E. WHITLEY *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 598 Jan. 1994
Avail: CASI HC A01/MF A03

The Advanced Integrated Life Support System Program (AILSS) is an advanced development effort to integrate the life support and protection requirements using the U.S. Navy's fighter/attack mission as a starting point. The goal of AILSS is to optimally mate protection from altitude, acceleration, chemical/biological agent, thermal environment (hot, cold, and cold water immersion) stress as well as mission enhancement through improved restraint, night vision, and head-mounted reticules and displays to ensure mission capability. The primary emphasis to date has been to establish garment design requirements and tradeoffs for protection. Here the garment and the human interface are treated as a system. Twelve state-off-the-art concepts from government and industry were evaluated for design versus performance. On the basis of a combination of centrifuge, thermal manikin data, thermal modeling, and mobility studies, some key design parameters have been determined. Future efforts will concentrate on the integration of protection through garment design and the use of a single layer, multiple function concept to streamline the garment system. Author

N94-33659*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
CHARACTERIZATION OF SPACECRAFT HUMIDITY CONDENSATE Abstract Only
SUSAN MUCKLE (Krug Life Sciences, Inc., Houston, TX.), JOHN R. SCHULTZ (Krug Life Sciences, Inc., Houston, TX.), and RICHARD L. SAUER *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 600 Jan. 1994
Avail: CASI HC A01/MF A03

When construction of Space Station Freedom reaches the Permanent Manned Capability (PMC) stage, the Water Recovery and Management Subsystem will be fully operational such that (distilled) urine, spent hygiene water, and humidity condensate will be reclaimed to provide water of potable quality. The reclamation technologies currently baselined to process these waste waters include adsorption, ion exchange, catalytic oxidation, and disinfection. To ensure that the baseline technologies will be able to effectively remove those compounds presenting a health risk to the crew, the National Research Council has recommended that additional information be gathered on specific contaminants in waste waters representative of those to be encountered on the Space Station. With the application of new analytical methods and the analysis of waste water samples more representative of the Space Station environment, advances in the identification of the specific contaminants continue to be made. Efforts by the Water and Food Analytical Laboratory at JSC were successful in enlarging the database of contaminants in humidity condensate. These efforts have not only included the chemical characterization of condensate generated during ground-based studies, but most significantly the characterization of cabin and Spacelab condensate generated during Shuttle missions. The analytical results presented in this paper will be used to show how the composition of condensate varies amongst enclosed environments and thus the importance of collecting condensate from an environment close to that of the proposed Space Station. Although advances were made in the characterization of space condensate, complete characterization, particularly of the organics, requires further development of analytical methods. Author (revised)

N94-33660*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
COMPUTATION OF IODINE SPECIES CONCENTRATIONS IN WATER Abstract Only
JOHN R. SCHULTZ (Krug Life Sciences, Inc., Houston, TX.), PAUL D. MUDGETT (Krug Life Sciences, Inc., Houston, TX.), DAVID T. FLANAGAN (Krug Life Sciences, Inc., Houston, TX.), and RICHARD L. SAUER *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 601 Jan. 1994
Avail: CASI HC A01/MF A03

During an evaluation of the use of iodine as a water disinfectant and the development of methods for measuring various iodine species in water onboard Space Freedom, it became necessary to compute the concentration of the various species based on equilibrium principles alone. Of particular concern was the case when various amounts of iodine, iodide, strong acid, and strong base are added to water. Such solutions can be used to evaluate the performance of various monitoring methods being considered. The authors of this paper present an overview of aqueous iodine chemistry, a set of nonlinear equations which can be used to model the above case, and a computer program for solving this system of equations using the Newton-Raphson method. The program was validated by comparing results over a range of concentrations and pH values with those previously presented by Gottardi for a given pH. Use of this program indicated that there are multiple roots to many cases and selecting an appropriate initial guess is important. Comparison of program results with laboratory results for the case when only iodine is added to water indicates the program gives high pH values for the iodine concentrations normally used for water disinfection. Extending the model to include the effects of iodate formation results in the computer pH values being closer to those observed, but the model with iodate does not agree well for the case in which base is added in addition to iodine to raise the pH. Potential explanations include failure to obtain equilibrium conditions in the lab, inaccuracies in published values for the equilibrium constants, and inadequate model of iodine chemistry and/or the lack of adequate analytical methods for measuring the various iodine species in water. Author (revised)

N94-33661*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
A VOLATILE ORGANIC ANALYZER FOR SPACE STATION: DESCRIPTION AND EVALUATION OF A GAS CHROMATOGRAPHY/ ION MOBILITY Abstract Only
THOMAS F. LIMERO (Krug Life Sciences, Inc., Houston, TX.) and JOHN T. JAMES *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 602 Jan. 1994
Avail: CASI HC A01/MF A03

A Volatile Organic Analyzer (VOA) is being developed as an essential component of the Space Station's Environmental Health System (EHS) air quality monitoring strategy to provide warning to the crew and ground personnel if volatile organic compounds exceed established exposure limits. The short duration of most

Shuttle flights and the relative simplicity of the contaminant removal mechanism have lessened the concern about crew exposure to air contaminants on the Shuttle. However, the longer missions associated with the Space Station, the complex air revitalization system and the proposed number of experiments have led to a desire for real-time monitoring of the contaminants in the Space Station atmosphere. Achieving the performance requirements established for the VOA within the Space Station resource (e.g., power, weight) allocations led to a novel approach that joined a gas chromatograph (GC) to an ion mobility spectrometer (IMS). The authors of this paper will discuss the rational for selecting the GC/IMS technology as opposed to the more established gas chromatography/mass spectrometry (GC/MS) for the foundation of the VOA. The data presented from preliminary evaluations will demonstrate the versatile capability of the GC/IMS to analyze the major contaminants expected in the Space Station atmosphere. The favorable GC/IMS characteristics illustrated in this paper included excellent sensitivity, dual-mode operation for selective detection, and mobility drift times to distinguish co-eluting GC peaks. Preliminary studies have shown that the GC/IMS technology can meet surpass the performance requirements of the Space Station VOA. Author (revised)

N94-33662*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

SAFETY CONCERNS FOR FIRST ENTRY OPERATIONS OF ORBITING SPACECRAFT Abstract Only

STEVEN H. WILSON (Krug Life Sciences, Inc., Houston, TX.), THOMAS F. LIMERO (Krug Life Sciences, Inc., Houston, TX.), and JOHN T. JAMES *In its* Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 603 Jan. 1994

Avail: CASI HC A01/MF A03

The Space Station Freedom crew will face operational problems unique to the spacecraft environment due to the absence of convection currents and the confined atmosphere within the habitable modules. Airborne contaminants from the materials offgassing or contingency incidents like thermodegradation may accumulate until they reach hazardous concentrations. Flow modeling and experiences from previous space flight missions confirm that caution must be exercised during first-entry operations. A review of the first-entry procedures performed during the Skylab Program will be presented to highlight the necessity for carefully planned operations. Many of the environmental conditions that can be expected on the Space Station are analogous to those which exist in confined storage or work spaces in the industrial setting. Experience with closed-loop environmental operations (e.g., atmospheric control of submarines) have also demonstrated that the buildup of trace contaminant gases could result in conditions that lead to mission termination or loss of crew. Consequently, some first-entry issues for the Station can be addressed by comparing them to familiar techniques developed on Earth. The instruments of the Environmental Health System (EHS) will provide the necessary monitoring capability to protect crew health and safety during the planned first-entry procedures of the MTC phase of the SSF Program. The authors of this paper will describe those procedures and will cite an example of the consequences when proper first-entry procedures are not followed. Author (revised)

N94-33663*# McDonnell Aircraft Co., Saint Louis, MO.

UNIQUE METHODS FOR ON-ORBIT STRUCTURAL REPAIR, MAINTENANCE, AND ASSEMBLY

RAY ANDERSON and PHIL FUSON *In* NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2 p 605-610 Jan. 1994

Avail: CASI HC A02/MF A03

This paper reviews the MDA independent research and development (IRAD) efforts since 1986 in the development of two distinctly different approaches to on-orbit tube repair: (1) one-piece mechanical tube fittings that are forced, under pressure, onto the tube outer surface to effect the repair; and (2) electron beam weldings as demonstrated with the Paton-developed universal hand tool (UHT) space welding system for the repair of fluid lines and tubular components. Other areas of potential on-orbit repair using the UHT include damage to the flat or curved surfaces of habitation modules and truss assemblies. This paper will also address MDA evaluation of the Paton UHT system for on-orbit coating, cleaning, brazing, and cutting of metals. MDA development of an on-orbit compatible nondestructive evaluation (NDE) system for the inspection of tube welds is an important part of this complete space welding capability and will be discussed in a separate paper. Author

N94-33707 Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).

EFFECTS OF HEAT ACCLIMATION ON HEAT-EXERCISE TOLERANCE IN UNTRAINED AND ENDURANCE-TRAINED MEN WEARING NBC PROTECTIVE CLOTHING

YUKITOSHI AOYAGI, TOM M. MCLELLAN, and ROY J. SHEPHARD Aug. 1993 37 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(AD-A277522; DCIEM-93-47) Avail: CASI HC A03

Responses were compared between nine untrained (UT) men and six men who had participated in 8 weeks of endurance training (ET). Both groups underwent 6 days of heat acclimation in a climatic chamber that was maintained at 40 +/- 0.5 C and 30 +/- 1% rh. Subjects were tested before and after acclimation wearing either standard military combat clothing or nuclear, biological and/or chemical (NBC) protective clothing. Test sessions involved treadmill walking at 4.8 km/h and 2% grade for a maximum of 120 min. In UT subjects, heat acclimation increased plasma volume (+8 +/- 2%), but VO sub 2max and heat-exercise tolerance time were unchanged. When wearing standard combat clothing, acclimation decreased average values of heart rate, rectal temperature (T sub re), mean skin temperature (T sub sk), thermal discomfort, and metabolic heat production. When wearing NBC protective clothing, the only significant change was in T sub re. Acclimation induced an increase of sweat secretion but no statistically significant increase of sweat evaporation in NBC protective clothing. In ET subjects, acclimation reduced thermal discomfort when wearing standard combat clothing, and T sub re and T sub sk when wearing NBC protective clothing. The results suggest that heat acclimation did little to improve exercise tolerance when wearing NBC protective clothing in hot environments, although it reduced thermoregulatory strain by lowering mean body temperature, irrespective of training status. DTIC

N94-33781 Department of the Navy, Washington, DC.

ADVANCED EYE OR SENSOR PROTECTION AND HIGH SPEED VARIABLE OPTICAL ATTENUATION SYSTEM Patent

WILLIAM B. CUSHMAN, inventor (to Navy) 19 Oct. 1993 5 p Filed 14 Feb. 1992

(AD-D016150; US-PATENT-5,255,117; US-PATENT-APPL-SN-842287; US-PATENT-CLASS-359-234) Avail: US Patent and Trademark Office

In order to protect the eyes or other sensor, from light produced, e.g., by modern laser weapons which have extremely fast onset times and high power per pulse, a protective shutter device is provided which is based on the integrative property of such sensors. The sensor is shielded for a large proportion of the time and only exposed after a light detector associated with the protective device has assured a safe environment. The normal exposure provided is a series of rapid image-views that integrate over time within the sensor. In an eye goggles embodiment, clear vision is maintained and a fast-response variable-density 'sunglass' is perceived by the wearer. Only one eye is exposed and thus at risk at any one time, and that eye only about 10% of the total time. A high-speed mechanical shutter controls the exposure experienced by the sensor. DTIC

N94-33957*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

EVALUATION OF LENS DISTORTION ERRORS USING AN UNDERWATER CAMERA SYSTEM FOR VIDEO-BASED MOTION ANALYSIS

JEFFREY POLINER (Lockheed Engineering and Sciences Co., Houston, TX.), LAUREN FLETCHER, and GLENN K. KLUTE Jul. 1994 19 p
(NASA-TM-104795; S-769; NAS 1.15:104795) Avail: CASI HC A03/MF A01

Video-based motion analysis systems are widely employed to study human movement, using computers to capture, store, process, and analyze video data. This data can be collected in any environment where cameras can be located. One of the NASA facilities where human performance research is conducted is the Weightless Environment Training Facility (WETF), a pool of water which simulates zero-gravity with neutral buoyance. Underwater video collection in the WETF poses some unique problems. This project evaluates the error caused by the lens distortion of the WETF cameras. A grid of points of known dimensions was constructed and videotaped using a video vault underwater system. Recorded images were played back on a VCR and a personal computer grabbed and stored the images on disk. These images were then digitized to give calculated coordinates for the grid points. Errors were calculated as the distance from the known coordinates of the points to the calculated coordinates. It was demonstrated that errors from lens distortion could be as high as 8 percent. By avoiding the outermost regions of a wide-angle lens, the error can be kept smaller. Author

N94-33973*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
TRACE CONTAMINANT CONTROL SIMULATION COMPUTER PROGRAM, VERSION 8.1
J. L. PERRY May 1994 126 p
(NASA-TM-108457; NAS 1.15:108457) Avail: CASI HC A07/MF A02

The Trace Contaminant Control Simulation computer program is a tool for assessing the performance of various process technologies for removing trace chemical contamination from a spacecraft cabin atmosphere. Included in the simulation are chemical and physical adsorption by activated charcoal, chemical adsorption by lithium hydroxide, absorption by humidity condensate, and low- and high-temperature catalytic oxidation. Means are provided for simulating regenerable as well as nonregenerable systems. The program provides an overall mass balance of chemical contaminants in a spacecraft cabin given specified generation rates. Removal rates are based on device flow rates specified by the user and calculated removal efficiencies based on cabin concentration and removal technology experimental data. Versions 1.0 through 8.0 are documented in NASA TM-108409. TM-108409 also contains a source file listing for version 8.0. Changes to version 8.0 are documented in this technical memorandum and a source file listing for the modified version, version 8.1, is provided. Detailed descriptions for the computer program subprograms are extracted from TM-108409 and modified as necessary to reflect version 8.1. Version 8.1 supersedes version 8.0. Information on a separate user's guide is available from the author. Author

N94-34035*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
EVA-SCRAM OPERATIONS
LEE A. FLANIGAN (Rockwell International Corp., Huntsville, AL.), DAVID TAMIR (Rockwell International Corp., Cocoa Beach, FL.), JACK L. WEEKS (Rockwell International Corp., Huntsville, AL.), SIDNEY R. MCCLURE, and ANDREW G. KIMBROUGH *In* NASA. Johnson Space Center, The Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 1 p 121-129 Jan. 1994
Avail: CASI HC A02/MF A04

This paper wrestles with the on-orbit operational challenges introduced by the proposed Space Construction, Repair, and Maintenance (SCRAM) tool kit for Extra-Vehicular Activity (EVA). SCRAM undertakes a new challenging series of on-orbit tasks in support of the near-term Hubble Space Telescope, Extended Duration Orbiter, Long Duration Orbiter, Space Station Freedom, other orbital platforms, and even the future manned Lunar/Mars missions. These new EVA tasks involve welding, brazing, cutting, coating, heat-treating, and cleaning operations. Anticipated near-term EVA-SCRAM applications include construction of fluid lines and structural members, repair of punctures by orbital debris, refurbishment of surfaces eroded by atomic oxygen, and cleaning of optical, solar panel, and high emissivity radiator surfaces which have been degraded by contaminants. Future EVA-SCRAM applications are also examined, involving mass production tasks automated with robotics and artificial intelligence, for construction of large truss, aerobrake, and reactor shadow shield structures. Realistically achieving EVA-SCRAM is examined by addressing manual, teleoperated, semi-automated, and fully-automated operation modes. The operational challenges posed by EVA-SCRAM tasks are reviewed with respect to capabilities of existing and upcoming EVA systems, such as the Extravehicular Mobility Unit, the Shuttle Remote Manipulating System, the Dexterous End Effector, and the Servicing Aid Tool. Author

N94-34389# Federal Aviation Administration, Oklahoma City, OK. Civil Aeromedical Inst.
THE EFFECTS OF COLD EXPOSURE ON WET AIRCRAFT PASSENGERS: A REVIEW Final Report
ROBERT P. GARNER, BRUCE C. WILCOX, HARVEY M. ENGLAND, and VAN B. NAKAGAWARA May 1994 12 p
(DOT/FAA/AM-94/10) Avail: CASI HC A03/MF A01

The incorporation of a cabin water spray system (CWSS) aboard commercial passenger aircraft has been suggested as a mechanism of reducing passenger death and injury from the fire and smoke commonly associated with aircraft accidents. A potential health risk associated with a CWSS is the physiological stress that would be imposed upon an individual by being wet from a CWSS in the aircraft cabin and then evacuated into a cold environment. The severity of this type of exposure would be proportional to the degree to which the individual was doused with water and the wind speed and inversely proportionally to the ambient temperature. The physiological responses to partial wetting and subsequent exposure to cold environmental conditions have not been studied. The effects of cold exposure as well as the degree of protection provided to the individual, particularly the cardiorespiratory system, by CWSS would need to be fully investigated to determine if the survival benefits of a CWSS outweigh the potential health risks. Author

N94-34627# Sikorsky Aircraft, Stratford, CT. Crew Station Design.
EXPANDING THE PILOT'S ENVELOPE
BRUCE E. HAMILTON *In* AGARD, Technologies for Highly Manoeuvrable Aircraft 6 p Mar. 1994
Copyright Avail: CASI HC A02/MF A03

Advances in aircraft technology have allowed the construction of fighters which can easily exceed the pilot's capability to react and to sustain G forces. Advances in avionics have allowed these airframes to be fitted with sensors, weapons, and data processors to the point that the workload associated with mission accomplishment sometimes exceeds the pilot's capabilities. Consequently, some aircraft capabilities are rarely used due to lack of familiarity. These developments highlight the fact that the ability of the aircraft to fulfill its mission is dependent upon the pilot's utilizing its capabilities as an integrated weapon system. Pilots, like airframes, have operational envelopes and expanding the pilot's envelope allows fuller exploitation of the airframe's envelope and the avionics capabilities. The nature of the pilot's envelope is presented along with attributes of a pilot interface which support expansion of the pilot's envelope. Author (revised)

N94-34706*# Sterling Software, Inc., Palo Alto, CA.
MAN-MACHINE INTEGRATION DESIGN AND ANALYSIS SYSTEM (MIDAS) TASK LOADING MODEL (TLM) EXPERIMENTAL AND SOFTWARE DETAILED DESIGN REPORT
LOWELL STAVELAND May 1994 75 p Sponsored in cooperation

with USAATCOM
(Contract NAS2-13210)
(NASA-CR-177640; A-94080; NAS 1.26:177640; USAATCOM-TR-94-A-012) Avail: CASI HC A04/MF A01

This is the experimental and software detailed design report for the prototype task loading model (TLM) developed as part of the man-machine integration design and analysis system (MIDAS), as implemented and tested in phase 6 of the Army-NASA Aircrew/Aircraft Integration (A3I) Program. The A3I program is an exploratory development effort to advance the capabilities and use of computational representations of human performance and behavior in the design, synthesis, and analysis of manned systems. The MIDAS TLM computationally models the demands designs impose on operators to aide engineers in the conceptual design of aircraft crewstations. This report describes TLM and the results of a series of experiments which were run this phase to test its capabilities as a predictive task demand modeling tool. Specifically, it includes discussions of: the inputs and outputs of TLM, the theories underlying it, the results of the test experiments, the use of the TLM as both stand alone tool and part of a complete human operator simulation, and a brief introduction to the TLM software design.

Derived from text

N94-35115* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
PROSTHETIC ELBOW JOINT Patent
BRUCE C. WEDDENDORF, inventor (to NASA) 24 May 1994 9 p Filed 8 Jul. 1992 Supersedes N93-30566 (31 - 11, p 3508)
(NASA-CASE-MFS-28707-1; US-PATENT-5,314,500; US-PATENT-APPL-SN-912953; US-PATENT-CLASS-623-57; US-PATENT-CLASS-623-59; US-PATENT-CLASS-623-60; INT-PATENT-CLASS-A61F-2/66; INT-PATENT-CLASS-A61F-2/54; INT-PATENT-CLASS-A61F-2/58) Avail: US Patent and Trademark Office

An artificial, manually positionable elbow joint for use in an upper extremity, above-elbow, prosthetic is described. The prosthesis provides a locking feature that is easily controlled by the wearer. The instant elbow joint is very strong and durable enough to withstand the repeated heavy loadings encountered by a wearer who works in an industrial, construction, farming, or similar environment. The elbow joint of the present invention comprises a turntable, a frame, a forearm, and a locking assembly. The frame generally includes a housing for the locking assembly and two protruding ears. The forearm includes an elongated beam having a cup-shaped cylindrical member at one end and a locking wheel having a plurality of holes along a circular arc on its other end with a central bore for pivotal attachment to the protruding ears of the frame. The locking assembly includes a collar having a central opening with a plurality of internal grooves, a plurality of internal cam members each having a chamfered surface at one end and a V-shaped slot at its other end; an elongated locking pin having a crown wheel with cam surfaces and locking lugs secured thereto; two coiled compression springs; and a flexible filament attached to one end of the elongated locking pin and extending from the locking assembly for extending and retracting the locking pin into the holes in the locking wheel to permit selective adjustment of the forearm relative to the frame. In use, the turntable is affixed to the upper arm part of the prosthetic in the conventional manner, and the cup-shaped cylindrical member on one end of the forearm is affixed to the forearm piece of the prosthetic in the conventional manner. The elbow joint is easily adjusted and locked between maximum flex and extended positions.

Official Gazette of the U.S. Patent and Trademark Office

55
SPACE BIOLOGY

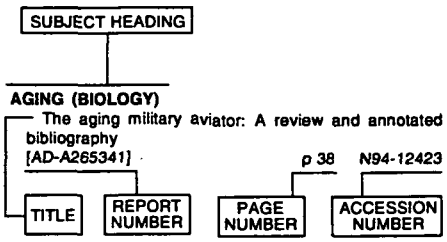
Includes exobiology; planetary biology; and extraterrestrial life.

N94-34951*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
US EXPERIMENT FLOWN ON THE SOVIET BIOSATELLITE COSMOS 1667 Final Report
JOHN W. HINES, ed. and MICHAEL G. SKIDMORE, ed. May 1994 133 p
(Contract RTOP 199-70-12)
(NASA-TM-108803; A-94032; NAS 1.15:108803) Avail: CASI HC A07/MF A02

Two male young-adult rhesus monkeys were flown on the Soviet Biosatellite Cosmos 1667 for seven days from July 10-17, 1985. Both animals were instrumented to record neurophysiological parameters. One animal, Gordyy, was additionally instrumented to record cardiovascular changes. Space capsule and environmental parameters were very similar to those of previous missions. On Cosmos 1514, which flew for five days in 1983, one animal was fitted with a left carotid artery cuff to measure blood pressure and flow velocity. An additional feature of Cosmos 1667 was a postflight control study using the flight animal. Intermittent postural tilt tests were also conducted before and after spaceflight and synchronous control studies, to simulate the fluid shifts associated with spaceflight. The experiment results support the conclusion derived from Cosmos 1514 that significant cardiovascular changes occur with spaceflight. The changes most clearly seen were rapid initial decreases in heart rate and further decreases with continued exposure to microgravity. The triggering mechanism appeared to be a headward shift in blood and tissue fluid volume which, in turn, triggered adaptive cardiovascular changes. Adaptive changes took place rapidly and began to stabilize after the first two days of flight. However, these changes did not plateau in the animal by the last day of the mission.

Author

Typical Subject Index Listing



The subject heading is a key to the subject content of the document. The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of document content, a title extension is added, separated from the title by three hyphens. The accession number and the page number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number is also included as an aid in identifying the document. Under any one subject heading, the accession numbers are arranged in sequence.

A

ABDOMEN
Telemedicine, virtual reality, and surgery
p 245 N94-33641

ABSORBENTS
Integration of the Molecular Sieve Oxygen Generating System (MSOGS) into the UH-60Q MEDEVAC Blackhawk
[AD-A277668] p 252 N94-33589

ACCELERATION PROTECTION
The US Navy/Canadian DCIEM research initiative on pressure breathing physiology p 254 N94-33636

ACCELERATION TOLERANCE
Comparative performance of a modified Space Shuttle Reentry Anti-G Suit (REAGS) with and without pressure socks p 255 N94-33655

ACOUSTIC ATTENUATION
A self-organizing neural network architecture for auditory and speech perception with applications to acoustic and other temporal prediction problems
[AD-A277526] p 247 N94-33708

ACOUSTIC PROPERTIES
Overview of NASA human response to sonic boom program p 244 N94-33499

ADHESION
Continuous monitoring of bacterial attachment
p 243 N94-33658

AEROEMBOLISM
Evaluation of pulsed Doppler bubble detection
[AD-A277920] p 248 N94-34695

AEROSPACE MEDICINE
Gravity, the third dimension of life support in space
p 254 N94-33635
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen
p 244 N94-33638
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings
p 245 N94-33639
Telemedicine, virtual reality, and surgery
p 245 N94-33641
The effectiveness of ground level post-flight 100 percent oxygen breathing as therapy for pain-only altitude Decompression Sickness (DCS) p 245 N94-33643
Safety concerns for first entry operations of orbiting spacecraft p 257 N94-33662
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 390)
[NASA-SP-7011(390)] p 248 N94-34602

AIR PURIFICATION
A volatile organic analyzer for Space Station: Description and evaluation of a gas chromatography/ ion mobility
p 256 N94-33661
Trace contaminant control simulation computer program, version 8.1
[NASA-TM-108457] p 258 N94-33973

AIR QUALITY
A volatile organic analyzer for Space Station: Description and evaluation of a gas chromatography/ ion mobility
p 256 N94-33661

AIR TRAFFIC CONTROLLERS (PERSONNEL)
Validity of the air traffic control specialist nonradar screen as a predictor of performance in radar-based air traffic control training
[DOT/FAA/AM-94/9] p 251 N94-34210

AIRCRAFT COMPARTMENTS
The effects of cold exposure on wet aircraft passengers: A review
[DOT/FAA/AM-94/10] p 258 N94-34389

AIRCRAFT CONFIGURATIONS
Overview of NASA human response to sonic boom program p 244 N94-33499

AIRCRAFT DESIGN
Anthropometric accommodation in USAF cockpits
p 253 N94-33630

ALGORITHMS
Estimation of the low-Earth-orbit debris population and distribution
[BTN-94-EIX94311322893] p 244 A94-60203
A rapid algorithm for realistic human reaching and its use in a virtual reality system p 253 N94-33621

AMINES
Cellular analysis of the startle reflex
[AD-A278243] p 244 N94-33380

ANTHROPOMETRY
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
Anthropometric accommodation in USAF cockpits
p 253 N94-33630

ARTIFICIAL INTELLIGENCE
EVA-SCRAM operations p 258 N94-34035
Finding accurate frontiers: A knowledge-intensive approach to relational learning p 251 N94-34044

ASTRONAUT TRAINING
Shared virtual environments for aerospace training
p 250 N94-34024

ASTRONAUTS
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
Emergency medical services p 245 N94-33644

AUDITORY PERCEPTION
A self-organizing neural network architecture for auditory and speech perception with applications to acoustic and other temporal prediction problems
[AD-A277526] p 247 N94-33708
Pattern analysis based models of masking by spatially separated sound sources
[AD-A277882] p 247 N94-33779

AUDITORY SENSATION AREAS
Cellular analysis of the startle reflex
[AD-A278243] p 244 N94-33380

AUDITORY SIGNALS
A self-organizing neural network architecture for auditory and speech perception with applications to acoustic and other temporal prediction problems
[AD-A277526] p 247 N94-33708

AUDITORY STIMULI
Cellular analysis of the startle reflex
[AD-A278243] p 244 N94-33380

AUTOMATION
Automating the training development process for mission flight operations p 249 N94-33625

AVIATION PSYCHOLOGY
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 390)
[NASA-SP-7011(390)] p 248 N94-34602

B

BAYES THEOREM
Formal design and evaluation of a variety of medical diagnostic programs
[PB94-149622] p 247 N94-34111

BIBLIOGRAPHIES
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 390)
[NASA-SP-7011(390)] p 248 N94-34602

BINAURAL HEARING
Pattern analysis based models of masking by spatially separated sound sources
[AD-A277882] p 247 N94-33779

BIOASTRONAUTICS
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637
Hydration and blood volume effects on human thermoregulation in the heat: Space applications
p 246 N94-33651

BIOCHEMISTRY
Phase-sensitive flow cytometry: New technology for analyzing biochemical, functional, and structural features in fluorochrome-labeled cells and particles
[DE94-003960] p 243 N94-33734

BIODYNAMICS
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
Anthropometric accommodation in USAF cockpits
p 253 N94-33630

BIOLOGICAL MODELS (MATHEMATICS)
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652

BIOSYNTHESIS
Enzymology and molecular biology of cell wall biosynthesis
[DE94-008585] p 243 N94-34008

BLOOD VOLUME
Hydration and blood volume effects on human thermoregulation in the heat: Space applications
p 246 N94-33651

BODY FLUIDS
Hydration and blood volume effects on human thermoregulation in the heat: Space applications
p 246 N94-33651

BODY TEMPERATURE
Modeling heat exchange characteristics of long term space operations: Role of skin wettedness and exercise
p 255 N94-33650
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652

BRAIN
The cognitive, perceptual, and neural bases of skilled performance
[AD-A277608] p 250 N94-33849

BUBBLES
Evaluation of pulsed Doppler bubble detection
[AD-A277920] p 248 N94-34695

C

CAPE KENNEDY LAUNCH COMPLEX
KSC wildlife show
[NASA-TM-109808] p 243 N94-33770

CARDIOVASCULAR SYSTEM
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637
US experiment flown on the Soviet biosatellite Cosmos 1667
[NASA-TM-108803] p 259 N94-34951
CELL MEMBRANES (BIOLOGY)
Enzymology and molecular biology of cell wall biosynthesis
[DE94-008585] p 243 N94-34008
CENTRAL NERVOUS SYSTEM
A model for predicting central nervous system toxicity from hyperbaric oxygen exposure in man: Effects of immersion, exercise, and old and new data
[AD-A278348] p 247 N94-34005
CENTRAL NERVOUS SYSTEM DEPRESSANTS
Effect of barbiturates and hyperoxia on lipid peroxidation in hypoxic neurons
[AD-A278467] p 244 N94-33545
CENTRIFUGING
Gravity, the third dimension of life support in space p 254 N94-33635
CENTRIFUGING STRESS
Comparative performance of a modified Space Shuttle Reentry Anti-G Suit (REAGS) with and without pressure socks p 255 N94-33655
CHROMOSOMES
Phase-sensitive flow cytometry: New technology for analyzing biochemical, functional, and structural features in fluorochrome-labeled cells and particles
[DE94-003960] p 243 N94-33734
CIRCADIAN RHYTHMS
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
CLIMATOLOGY
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707
CLINICAL MEDICINE
The effectiveness of ground level post-flight 100 percent oxygen breathing as therapy for pain-only altitude Decompression Sickness (DCS) p 245 N94-33643
Phase-sensitive flow cytometry: New technology for analyzing biochemical, functional, and structural features in fluorochrome-labeled cells and particles
[DE94-003960] p 243 N94-33734
Surgery applications of virtual reality p 247 N94-34025
COCHLEA
Cellular analysis of the startle reflex
[AD-A278243] p 244 N94-33380
COCKPITS
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628
Anthropometric accommodation in USAF cockpits p 253 N94-33630
COGNITION
The cognitive, perceptual, and neural bases of skilled performance
[AD-A277608] p 250 N94-33849
COMPLEX SYSTEMS
A volatile organic analyzer for Space Station: Description and evaluation of a gas chromatography/ ion mobility p 256 N94-33661
COMPUTER AIDED DESIGN
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628
COMPUTER ASSISTED INSTRUCTION
Automating the training development process for mission flight operations p 249 N94-33625
COMPUTER GRAPHICS
A rapid algorithm for realistic human reaching and its use in a virtual reality system p 253 N94-33621
COMPUTER PROGRAMS
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
Trace contaminant control simulation computer program, version 8.1
[NASA-TM-108457] p 258 N94-33973
COMPUTER TECHNIQUES
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647
Formal design and evaluation of a variety of medical diagnostic programs
[PB94-149622] p 247 N94-34111
COMPUTERIZED SIMULATION
Fusion interfaces for tactical environments: An application of virtual reality technology p 252 N94-33619
Virtual reality as a human factors design analysis tool: Macro-ergonomic application validation and assessment of the Space Station Freedom payload control area p 252 N94-33620
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
Telemedicine, virtual reality, and surgery p 245 N94-33641
Trace contaminant control simulation computer program, version 8.1
[NASA-TM-108457] p 258 N94-33973
Shared virtual environments for aerospace training p 250 N94-34024
Surgery applications of virtual reality p 247 N94-34025
CONDENSATES
Characterization of spacecraft humidity condensate p 256 N94-33659
CONFERENCES
Workshop on Self-Determination in Developing and Evolving systems
[AD-A278367] p 250 N94-33737
Pattern analysis based models of masking by spatially separated sound sources
[AD-A277882] p 247 N94-33779
CONTAMINANTS
A volatile organic analyzer for Space Station: Description and evaluation of a gas chromatography/ ion mobility p 256 N94-33661
Safety concerns for first entry operations of orbiting spacecraft p 257 N94-33662
CONTAMINATION
Continuous monitoring of bacterial attachment p 243 N94-33658
CONTRAST
Effects of lighting and task parameters on visual acuity and performance
[ISBN-9-51-221845-3] p 251 N94-34699
CONTROL EQUIPMENT
HFE safety reviews of advanced nuclear power plant control rooms p 252 N94-33613
EVA-SCRAM operations p 258 N94-34035
CONTROL SIMULATION
Trace contaminant control simulation computer program, version 8.1
[NASA-TM-108457] p 258 N94-33973
CONTROL SYSTEMS DESIGN
HFE safety reviews of advanced nuclear power plant control rooms p 252 N94-33613
COOLING
Personal cooling systems: Possibilities and limitations p 254 N94-33649
COOLING SYSTEMS
Personal cooling systems: Possibilities and limitations p 254 N94-33649
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653
CREW PROCEDURES (INFLIGHT)
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
CREW WORKSTATIONS
Anthropometric accommodation in USAF cockpits p 253 N94-33630
Man-machine Integration Design and Analysis System (MIDAS) Task Loading Model (TLM) experimental and software detailed design report
[NASA-CR-177640] p 258 N94-34706
CREWS
La Chalupa-30: Lessons learned from a 30-day subsea mission analogue p 249 N94-33654
CROP VIGOR
Assisting wine growers
[NASA-TM-108812] p 243 N94-33564
CYTOLOGY
Phase-sensitive flow cytometry: New technology for analyzing biochemical, functional, and structural features in fluorochrome-labeled cells and particles
[DE94-003960] p 243 N94-33734
CYTOMETRY
Phase-sensitive flow cytometry: New technology for analyzing biochemical, functional, and structural features in fluorochrome-labeled cells and particles
[DE94-003960] p 243 N94-33734

D

DATA ACQUISITION
The US Navy/Canadian DCIEM research initiative on pressure breathing physiology p 254 N94-33636
La Chalupa-30: Lessons learned from a 30-day subsea mission analogue p 249 N94-33654
DATA BASES
Formal design and evaluation of a variety of medical diagnostic programs
[PB94-149622] p 247 N94-34111
DECOMPRESSION SICKNESS
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings p 245 N94-33639
The effectiveness of ground level post-flight 100 percent oxygen breathing as therapy for pain-only altitude Decompression Sickness (DCS) p 245 N94-33643
DECONTAMINATION
Trace contaminant control simulation computer program, version 8.1
[NASA-TM-108457] p 258 N94-33973
DEFENSE PROGRAM
Emergency medical services p 245 N94-33644
DEHYDRATION
Hydration and blood volume effects on human thermoregulation in the heat: Space applications p 246 N94-33651
DENITROGENATION
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen p 244 N94-33638
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings p 245 N94-33639
DEOXYRIBONUCLEIC ACID
Phase-sensitive flow cytometry: New technology for analyzing biochemical, functional, and structural features in fluorochrome-labeled cells and particles
[DE94-003960] p 243 N94-33734
DESIGN ANALYSIS
HFE safety reviews of advanced nuclear power plant control rooms p 252 N94-33613
Virtual reality as a human factors design analysis tool: Macro-ergonomic application validation and assessment of the Space Station Freedom payload control area p 252 N94-33620
Anthropometric accommodation in USAF cockpits p 253 N94-33630
DETECTION
Evaluation of pulsed Doppler bubble detection
[AD-A277920] p 248 N94-34695
DIAGNOSIS
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647
Formal design and evaluation of a variety of medical diagnostic programs
[PB94-149622] p 247 N94-34111
DIETS
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640
DISASTERS
Crisis and disaster research: A review
[PB94-149234] p 251 N94-34108
DISPLAY DEVICES
Fusion interfaces for tactical environments: An application of virtual reality technology p 252 N94-33619
Validity of the air traffic control specialist nonradar screen as a predictor of performance in radar-based air traffic control training
[DOT/FAA/AM-94/9] p 251 N94-34210
DISTORTION
Evaluation of lens distortion errors using an underwater camera system for video-based motion analysis
[NASA-TM-104795] p 257 N94-33957
DOMAINS
Finding accurate frontiers: A knowledge-intensive approach to relational learning p 251 N94-34044
DYNAMIC PROGRAMMING
Reinforcement learning in scheduling p 251 N94-34045

E

EARTH ORBITS
Estimation of the low-Earth-orbit debris population and distribution
[BTN-94-EIX94311322893] p 244 A94-60203
EDUCATION
Emergency medical services p 245 N94-33644
ELBOW (ANATOMY)
Prosthetic elbow joint
[NASA-CASE-MFS-28707-1] p 259 N94-35115
EMERGENCIES
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622
Emergency medical services p 245 N94-33644
Crisis and disaster research: A review
[PB94-149234] p 251 N94-34108
ENVIRONMENT EFFECTS
KSC wildlife show
[NASA-TM-109808] p 243 N94-33770

ENZYMOLOGY
Enzymology and molecular biology of cell wall biosynthesis
[DE94-008585] p 243 N94-34008
ERGOMETERS
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen
p 244 N94-33638
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings
p 245 N94-33639
ERROR ANALYSIS
Evaluation of lens distortion errors using an underwater camera system for video-based motion analysis
[NASA-TM-104795] p 257 N94-33957
EVACUATING (TRANSPORTATION)
Emergency medical services p 245 N94-33644
EVAPORATION
Modeling heat exchange characteristics of long term space operations: Role of skin wettedness and exercise
p 255 N94-33650
EVOKED RESPONSE (PSYCHOPHYSIOLOGY)
Cellular analysis of the startle reflex
[AD-A278243] p 244 N94-33380
EVOLUTION (DEVELOPMENT)
Workshop on Self-Determination in Developing and Evolving systems
[AD-A278367] p 250 N94-33737
EXERCISE PHYSIOLOGY
Hydration and blood volume effects on human thermoregulation in the heat: Space applications
p 246 N94-33651
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652
EXOBIOLOGY
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 390)
[NASA-SP-7011(390)] p 248 N94-34602
EXPERT SYSTEMS
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628
EXTRAVEHICULAR ACTIVITY
An ethnographic object-oriented analysis of explorer presence in a volcanic terrain environment: Claims and evidence
[NASA-TM-108823] p 252 N94-33608
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen
p 244 N94-33638
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings
p 245 N94-33639
EVA-SCRAM operations p 258 N94-34035
EXTRAVEHICULAR MOBILITY UNITS
EVA-SCRAM operations p 258 N94-34035
EYE DISEASES
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647
EYE PROTECTION
Advanced eye or sensor protection and high speed variable optical attenuation system
[AD-D016150] p 257 N94-33781

F

FITTINGS
Unique methods for on-orbit structural repair, maintenance, and assembly p 257 N94-33663
FLAT SURFACES
Unique methods for on-orbit structural repair, maintenance, and assembly p 257 N94-33663
FLIGHT CLOTHING
The US Navy/Canadian DCIEM research initiative on pressure breathing physiology p 254 N94-33636
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653
Current and future issues in USAF full pressure suit research and development p 255 N94-33656
Advanced integrated life support system update
p 256 N94-33657
FLIGHT CONTROL
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
FLIGHT CREWS
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622
Man-machine Integration Design and Analysis System (MIDAS) Task Loading Model (TLM) experimental and software detailed design report
[NASA-CR-177640] p 258 N94-34706
FLIGHT OPERATIONS
Automating the training development process for mission flight operations p 249 N94-33625
FLIGHT SIMULATORS
Fusion interfaces for tactical environments: An application of virtual reality technology
p 252 N94-33619
The US Navy/Canadian DCIEM research initiative on pressure breathing physiology p 254 N94-33636
FOREARM
Prosthetic elbow joint
[NASA-CASE-MFS-28707-1] p 259 N94-35115
FRACTIONATION
Enzymology and molecular biology of cell wall biosynthesis
[DE94-008585] p 243 N94-34008

G

GARMENTS
The US Navy/Canadian DCIEM research initiative on pressure breathing physiology p 254 N94-33636
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653
Advanced integrated life support system update
p 256 N94-33657
GAS ANALYSIS
Total hydrocarbon analysis by ion mobility spectrometry p 254 N94-33642
GAS CHROMATOGRAPHY
A volatile organic analyzer for Space Station: Description and evaluation of a gas chromatography/ ion mobility
p 256 N94-33661
GENETIC ENGINEERING
Enzymology and molecular biology of cell wall biosynthesis
[DE94-008585] p 243 N94-34008
GEOLOGY
An ethnographic object-oriented analysis of explorer presence in a volcanic terrain environment: Claims and evidence
[NASA-TM-108823] p 252 N94-33608
GLOVES
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
GOGGLES
Advanced eye or sensor protection and high speed variable optical attenuation system
[AD-D016150] p 257 N94-33781
GRAPHICAL USER INTERFACE
Shared virtual environments for aerospace training
p 250 N94-34024
GRAVITATION
Gravity, the third dimension of life support in space
p 254 N94-33635
GRAVITATIONAL EFFECTS
US experiment flown on the Soviet biosatellite Cosmos 1667
[NASA-TM-108803] p 259 N94-34951
GRAVITATIONAL PHYSIOLOGY
Gravity, the third dimension of life support in space
p 254 N94-33635
GROUND BASED CONTROL
Virtual reality as a human factors design analysis tool: Macro-ergonomic application validation and assessment of the Space Station Freedom payload control area
p 252 N94-33620
GROUND SUPPORT SYSTEMS
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
Automating the training development process for mission flight operations p 249 N94-33625

H

H-53 HELICOPTER
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628
H-60 HELICOPTER
Integration of the Molecular Sieve Oxygen Generating System (MSOGS) into the UH-60Q MEDEVAC Blackhawk
[AD-A277668] p 252 N94-33589
HABITATS
KSC wildlife show
[NASA-TM-109808] p 243 N94-33770
HEART RATE
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652
HEAT ACCLIMATIZATION
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707
HEAT TOLERANCE
Personal cooling systems: Possibilities and limitations
p 254 N94-33649
HEAT TRANSFER
Modeling heat exchange characteristics of long term space operations: Role of skin wettedness and exercise
p 255 N94-33650
HELICOPTER DESIGN
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628
HELICOPTER PERFORMANCE
Integration of the Molecular Sieve Oxygen Generating System (MSOGS) into the UH-60Q MEDEVAC Blackhawk
[AD-A277668] p 252 N94-33589
HELICOPTERS
Emergency medical services p 245 N94-33644
HEMODYNAMIC RESPONSES
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640
HIGH PRESSURE
Effect of barbiturates and hyperoxia on lipid peroxidation in hypoxic neurons
[AD-A278467] p 244 N94-33545
HIGH RESOLUTION
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645
HIGH TEMPERATURE ENVIRONMENTS
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640
HUBBLE SPACE TELESCOPE
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627
HUMAN BEHAVIOR
Crisis and disaster research: A review
[PB94-149234] p 251 N94-34108
HUMAN BEINGS
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707
Evaluation of pulsed Doppler bubble detection
[AD-A277920] p 248 N94-34695
HUMAN CENTRIFUGES
Gravity, the third dimension of life support in space
p 254 N94-33635
HUMAN FACTORS ENGINEERING
An ethnographic object-oriented analysis of explorer presence in a volcanic terrain environment: Claims and evidence
[NASA-TM-108823] p 252 N94-33608
HFE safety reviews of advanced nuclear power plant control rooms p 252 N94-33613
Fusion interfaces for tactical environments: An application of virtual reality technology
p 252 N94-33619
Virtual reality as a human factors design analysis tool: Macro-ergonomic application validation and assessment of the Space Station Freedom payload control area
p 252 N94-33620
A rapid algorithm for realistic human reaching and its use in a virtual reality system p 253 N94-33621
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623
Automating the training development process for mission flight operations p 249 N94-33625
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
Anthropometric accommodation in USAF cockpits
p 253 N94-33630
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653
Comparative performance of a modified Space Shuttle Reentry Anti-G Suit (REAGS) with and without pressure socks p 255 N94-33655
Current and future issues in USAF full pressure suit research and development p 255 N94-33656
Advanced integrated life support system update
p 256 N94-33657
Expanding the pilot's envelope p 258 N94-34627

Man-machine Integration Design and Analysis System (MIDAS) Task Loading Model (TLM) experimental and software detailed design report
[NASA-CR-177640] p 258 N94-34706

HUMAN PERFORMANCE
HFE safety reviews of advanced nuclear power plant control rooms p 252 N94-33613
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652
Stochastic models of attention and search
[AD-A278538] p 249 N94-33674
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707

HUMAN REACTIONS
Overview of NASA human response to sonic boom program p 244 N94-33499
Crisis and disaster research: A review
[PB94-149234] p 251 N94-34108

HUMAN TOLERANCES
Personal cooling systems: Possibilities and limitations p 254 N94-33649
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707

HUMAN-COMPUTER INTERFACE
HFE safety reviews of advanced nuclear power plant control rooms p 252 N94-33613
Fusion interfaces for tactical environments: An application of virtual reality technology p 252 N94-33619
Automating the training development process for mission flight operations p 249 N94-33625
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634

HUMIDITY
Characterization of spacecraft humidity condensate p 256 N94-33659

HYDRATION
Hydration and blood volume effects on human thermoregulation in the heat: Space applications p 246 N94-33651

HYDROCARBONS
Total hydrocarbon analysis by ion mobility spectrometry p 254 N94-33642

HYPEROXIA
Effect of barbiturates and hyperoxia on lipid peroxidation in hypoxic neurons
[AD-A278467] p 244 N94-33545
A model for predicting central nervous system toxicity from hyperbaric oxygen exposure in man: Effects of immersion, exercise, and old and new data
[AD-A278348] p 247 N94-34005

HYPOTENSION
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640

HYPOTHERMIA
The effects of cold exposure on wet aircraft passengers: A review
[DOT/FAA/AM-94/10] p 258 N94-34389

HYPOVOLEMIA
Hydration and blood volume effects on human thermoregulation in the heat: Space applications p 246 N94-33651

HYPOXIA
Effect of barbiturates and hyperoxia on lipid peroxidation in hypoxic neurons
[AD-A278467] p 244 N94-33545

I

ILLUMINANCE
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623

ILLUMINATING
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623
Effects of lighting and task parameters on visual acuity and performance
[ISBN-9-51-221845-3] p 251 N94-34699

IMAGE ANALYSIS
Evaluation of lens distortion errors using an underwater camera system for video-based motion analysis
[NASA-TM-104795] p 257 N94-33957

IMAGE PROCESSING
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647
Neural models of motion perception
[AD-A278362] p 250 N94-33857
Evaluation of lens distortion errors using an underwater camera system for video-based motion analysis
[NASA-TM-104795] p 257 N94-33957

IMAGERY
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645

IMAGING TECHNIQUES
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645
Evaluation of pulsed Doppler bubble detection
[AD-A277920] p 248 N94-34695

INDEXES (DOCUMENTATION)
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 390)
[NASA-SP-7011(390)] p 248 N94-34602

INFESTATION
Assisting wine growers
[NASA-TM-109812] p 243 N94-33564

INFORMATION
Finding accurate frontiers: A knowledge-intensive approach to relational learning p 251 N94-34044

INFORMATION PROCESSING (BIOLOGY)
Visual motion perception and visual information processing
[AD-A278530] p 248 N94-33595
Eye movements and visual information processing
[AD-A278364] p 250 N94-33700
Visual motion perception and visual information processing
[AD-A278370] p 250 N94-33738

INTRAVEHICULAR ACTIVITY
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629

IODINE
Continuous monitoring of bacterial attachment p 243 N94-33658
Computation of iodine species concentrations in water p 256 N94-33660

ION EXCHANGING
Characterization of spacecraft humidity condensate p 256 N94-33659

IONIC MOBILITY
Total hydrocarbon analysis by ion mobility spectrometry p 254 N94-33642

K

KNOWLEDGE BASES (ARTIFICIAL INTELLIGENCE)
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628
Formal design and evaluation of a variety of medical diagnostic programs
[PB94-149622] p 247 N94-34111

KNOWLEDGE REPRESENTATION
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628

L

LASER BEAMS
Advanced eye or sensor protection and high speed variable optical attenuation system
[AD-D016150] p 257 N94-33781

LASER WEAPONS
Advanced eye or sensor protection and high speed variable optical attenuation system
[AD-D016150] p 257 N94-33781

LEAKAGE
Total hydrocarbon analysis by ion mobility spectrometry p 254 N94-33642

LEARNING
Finding accurate frontiers: A knowledge-intensive approach to relational learning p 251 N94-34044
Reinforcement learning in scheduling p 251 N94-34045

LENSES
Evaluation of lens distortion errors using an underwater camera system for video-based motion analysis
[NASA-TM-104795] p 257 N94-33957

LIFE SCIENCES
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 390)
[NASA-SP-7011(390)] p 248 N94-34602

LIFE SUPPORT SYSTEMS
Gravity, the third dimension of life support in space p 254 N94-33635
Current and future issues in USAF full pressure suit research and development p 255 N94-33656
Advanced integrated life support system update p 256 N94-33657
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 390)
[NASA-SP-7011(390)] p 248 N94-34602

LIGHT (VISIBLE RADIATION)
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623

LIGHTING EQUIPMENT
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623

LIPIDS
Effect of barbiturates and hyperoxia on lipid peroxidation in hypoxic neurons
[AD-A278467] p 244 N94-33545

LIQUID COOLING
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653

LOCKING
Prosthetic elbow joint
[NASA-CASE-MFS-28707-1] p 259 N94-35115

LOGIC PROGRAMMING
Finding accurate frontiers: A knowledge-intensive approach to relational learning p 251 N94-34044

LONG DURATION SPACE FLIGHT
Gravity, the third dimension of life support in space p 254 N94-33635

LOWER BODY NEGATIVE PRESSURE
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637

LUMINANCE
Effects of lighting and task parameters on visual acuity and performance
[ISBN-9-51-221845-3] p 251 N94-34699

M

MACROMOLECULES
Phase-sensitive flow cytometry: New technology for analyzing biochemical, functional, and structural features in fluorochrome-labeled cells and particles
[DE94-003960] p 243 N94-33734

MAINTENANCE
Unique methods for on-orbit structural repair, maintenance, and assembly p 257 N94-33663

MALES
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707

MAN MACHINE SYSTEMS
A rapid algorithm for realistic human reaching and its use in a virtual reality system p 253 N94-33621
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 390)
[NASA-SP-7011(390)] p 248 N94-34602
Expanding the pilot's envelope p 258 N94-34627
Man-machine Integration Design and Analysis System (MIDAS) Task Loading Model (TLM) experimental and software detailed design report
[NASA-CR-177640] p 258 N94-34706

MANNED MARS MISSIONS
Mars transfer vehicle using regolith as propellant
[BTN-94-EIX94311322895] p 244 A94-60201

MASKING
Pattern analysis based models of masking by spatially separated sound sources
[AD-A277882] p 247 N94-33779

MASS DRIVERS
Mars transfer vehicle using regolith as propellant
[BTN-94-EIX94311322895] p 244 A94-60201

MATHEMATICAL MODELS
Stochastic models of attention and search
[AD-A278538] p 249 N94-33674

MEDICAL EQUIPMENT
Integration of the Molecular Sieve Oxygen Generating System (MSOGS) into the UH-60Q MEDEVAC Blackhawk
[AD-A277668] p 252 N94-33589

MEDICAL PERSONNEL
Emergency medical services p 245 N94-33644

MEDICAL SERVICES
Integration of the Molecular Sieve Oxygen Generating System (MSOGS) into the UH-60Q MEDEVAC *Blackhawk*
[AD-A277668] p 252 N94-33589
Telemedicine, virtual reality, and surgery p 245 N94-33641
Emergency medical services p 245 N94-33644

MENTAL HEALTH
La Chalupa-30: Lessons learned from a 30-day subsea mission analogue p 249 N94-33654
METAL SURFACES
Unique methods for on-orbit structural repair, maintenance, and assembly p 257 N94-33663
MICROGRAVITY
US experiment flown on the Soviet biosatellite Cosmos 1667
[NASA-TM-108803] p 259 N94-34951
MILITARY AIRCRAFT
Anthropometric accommodation in USAF cockpits p 253 N94-33630
MOLECULAR ABSORPTION
Integration of the Molecular Sieve Oxygen Generating System (MSOGS) into the UH-60Q MEDEVAC Blackhawk
[AD-A277668] p 252 N94-33589
MOLECULAR BIOLOGY
Enzymology and molecular biology of cell wall biosynthesis
[DE94-008585] p 243 N94-34008
MOTION PERCEPTION
Visual motion perception and visual information processing
[AD-A278530] p 248 N94-33595
Visual motion perception and visual information processing
[AD-A278370] p 250 N94-33738
The cognitive, perceptual, and neural bases of skilled performance
[AD-A277608] p 250 N94-33849
Neural models of motion perception
[AD-A278362] p 250 N94-33857
Evaluation of lens distortion errors using an underwater camera system for video-based motion analysis
[NASA-TM-104795] p 257 N94-33957

N

NASA PROGRAMS
Automating the training development process for mission flight operations p 249 N94-33625
Emergency medical services p 245 N94-33644
NERVES
Cellular analysis of the startle reflex
[AD-A278243] p 244 N94-33380
NEURAL NETS
A self-organizing neural network architecture for auditory and speech perception with applications to acoustic and other temporal prediction problems
[AD-A277526] p 247 N94-33708
Pattern analysis based models of masking by spatially separated sound sources
[AD-A277882] p 247 N94-33779
The cognitive, perceptual, and neural bases of skilled performance
[AD-A277608] p 250 N94-33849
Neural models of motion perception
[AD-A278362] p 250 N94-33857
NEUROPHYSIOLOGY
US experiment flown on the Soviet biosatellite Cosmos 1667
[NASA-TM-108803] p 259 N94-34951
NEWTON-RAPHSON METHOD
Computation of iodine species concentrations in water p 256 N94-33660
NOISE MEASUREMENT
Overview of NASA human response to sonic boom program p 244 N94-33499
NUCLEAR POWER PLANTS
HFE safety reviews of advanced nuclear power plant control rooms p 252 N94-33613

O

OPERATIONAL PROBLEMS
Safety concerns for first entry operations of orbiting spacecraft p 257 N94-33662
OPERATOR PERFORMANCE
Man-machine Integration Design and Analysis System (MIDAS) Task Loading Model (TLM) experimental and software detailed design report
[NASA-CR-177640] p 258 N94-34706
OPHTHALMOLOGY
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647
ORBITAL SERVICING
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627
EVA-SCRAM operations p 258 N94-34035
ORTHOSTATIC TOLERANCE
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637
OXYGEN
A model for predicting central nervous system toxicity from hyperbaric oxygen exposure in man: Effects of immersion, exercise, and old and new data
[AD-A278348] p 247 N94-34005
OXYGEN BREATHING
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings p 245 N94-33639
The effectiveness of ground level post-flight 100 percent oxygen breathing as therapy for pain-only altitude Decompression Sickness (DCS) p 245 N94-33643
OXYGEN CONSUMPTION
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen p 244 N94-33638
OXYGEN SUPPLY EQUIPMENT
Integration of the Molecular Sieve Oxygen Generating System (MSOGS) into the UH-60Q MEDEVAC Blackhawk
[AD-A277668] p 252 N94-33589
OXYGEN TENSION
Effect of barbiturates and hyperoxia on lipid peroxidation in hypoxic neurons
[AD-A278467] p 244 N94-33545

P

PARALLEL PROCESSING (COMPUTERS)
A self-organizing neural network architecture for auditory and speech perception with applications to acoustic and other temporal prediction problems
[AD-A277526] p 247 N94-33708
PARASITES
Assisting wine growers
[NASA-TM-109812] p 243 N94-33564
PASSENGER AIRCRAFT
The effects of cold exposure on wet aircraft passengers: A review
[DOT/FAA/AM-94/10] p 258 N94-34389
PASSENGERS
The effects of cold exposure on wet aircraft passengers: A review
[DOT/FAA/AM-94/10] p 258 N94-34389
PATHOGENS
Continuous monitoring of bacterial attachment p 243 N94-33658
PATTERN RECOGNITION
Neural models of motion perception
[AD-A278362] p 250 N94-33857
PAYLOAD CONTROL
Virtual reality as a human factors design analysis tool: Macro-ergonomic application validation and assessment of the Space Station Freedom payload control area p 252 N94-33620
PERFORMANCE PREDICTION
Validity of the air traffic control specialist nonradar screen as a predictor of performance in radar-based air traffic control training
[DOT/FAA/AM-94/9] p 251 N94-34210
PERFORMANCE TESTS
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628
The US Navy/Canadian DCIEM research initiative on pressure breathing physiology p 254 N94-33636
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653
Comparative performance of a modified Space Shuttle Reentry Anti-G Suit (REAGS) with and without pressure socks p 255 N94-33655
Effects of lighting and task parameters on visual acuity and performance
[ISBN-9-51-221845-3] p 251 N94-34699
PERSONNEL
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
PERSONNEL MANAGEMENT
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
PERSONNEL SELECTION
Validity of the air traffic control specialist nonradar screen as a predictor of performance in radar-based air traffic control training
[DOT/FAA/AM-94/9] p 251 N94-34210
PH
Computation of iodine species concentrations in water p 256 N94-33660
PHARMACOLOGY
Effect of barbiturates and hyperoxia on lipid peroxidation in hypoxic neurons
[AD-A278467] p 244 N94-33545
PHYSICAL EXERCISE
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen p 244 N94-33638
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings p 245 N94-33639
Modeling heat exchange characteristics of long term space operations: Role of skin wettedness and exercise p 255 N94-33650
A model for predicting central nervous system toxicity from hyperbaric oxygen exposure in man: Effects of immersion, exercise, and old and new data
[AD-A278348] p 247 N94-34005
PHYSIOLOGICAL EFFECTS
Effect of barbiturates and hyperoxia on lipid peroxidation in hypoxic neurons
[AD-A278467] p 244 N94-33545
A model for predicting central nervous system toxicity from hyperbaric oxygen exposure in man: Effects of immersion, exercise, and old and new data
[AD-A278348] p 247 N94-34005
PHYSIOLOGICAL RESPONSES
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen p 244 N94-33638
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652
The effects of cold exposure on wet aircraft passengers: A review
[DOT/FAA/AM-94/10] p 258 N94-34389
US experiment flown on the Soviet biosatellite Cosmos 1667
[NASA-TM-108803] p 259 N94-34951
PHYSIOLOGICAL TESTS
Comparative performance of a modified Space Shuttle Reentry Anti-G Suit (REAGS) with and without pressure socks p 255 N94-33655
PHYSIOLOGY
The US Navy/Canadian DCIEM research initiative on pressure breathing physiology p 254 N94-33636
Personal cooling systems: Possibilities and limitations p 254 N94-33649
PILOT ERROR
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622
PILOT PERFORMANCE
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622
Expanding the pilot's envelope p 258 N94-34627
PILOT TRAINING
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622
PLANETARY GEOLOGY
An ethnographic object-oriented analysis of explorer presence in a volcanic terrain environment: Claims and evidence
[NASA-TM-108823] p 252 N94-33608
POLYPEPTIDES
Enzymology and molecular biology of cell wall biosynthesis
[DE94-008585] p 243 N94-34008
POLYSACCHARIDES
Enzymology and molecular biology of cell wall biosynthesis
[DE94-008585] p 243 N94-34008
PORTABLE LIFE SUPPORT SYSTEMS
The US Navy/Canadian DCIEM research initiative on pressure breathing physiology p 254 N94-33636
POTABLE WATER
Continuous monitoring of bacterial attachment p 243 N94-33658
Characterization of spacecraft humidity condensate p 256 N94-33659
Computation of iodine species concentrations in water p 256 N94-33660
PREDICTION ANALYSIS TECHNIQUES
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627
PRESSURE BREATHING
The US Navy/Canadian DCIEM research initiative on pressure breathing physiology p 254 N94-33636
PRESSURE EFFECTS
Effect of barbiturates and hyperoxia on lipid peroxidation in hypoxic neurons
[AD-A278467] p 244 N94-33545
PRESSURE REDUCTION
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings p 245 N94-33639

PRESSURE SUITS
The US Navy/Canadian DCIEM research initiative on pressure breathing physiology p 254 N94-33636
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653
Comparative performance of a modified Space Shuttle Reentry Anti-G Suit (REAGS) with and without pressure socks p 255 N94-33655
Current and future issues in USAF full pressure suit research and development p 255 N94-33656
PRODUCTIVITY
Implementing bright light treatment for MSFC payload *operations shiftworkers* p 248 N94-33623
PROSTHETIC DEVICES
Prosthetic elbow joint
[NASA-CASE-MFS-28707-1] p 259 N94-35115
PROTECTION
Evaluation of pulsed Doppler bubble detection
[AD-A277920] p 248 N94-34695
PROTECTIVE CLOTHING
Personal cooling systems: Possibilities and limitations p 254 N94-33649
Advanced integrated life support system update p 256 N94-33657
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707
PROTEINS
Phase-sensitive flow cytometry: New technology for analyzing biochemical, functional, and structural features in fluorochrome-labeled cells and particles
[DE94-003960] p 243 N94-33734
PSEUDOMONAS
Continuous monitoring of bacterial attachment p 243 N94-33658
PSYCHOLOGICAL EFFECTS
La Chalupa-30: Lessons learned from a 30-day subsea mission analogue p 249 N94-33654
Crisis and disaster research: A review
[PB94-149234] p 251 N94-34108
PSYCHOLOGICAL TESTS
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622
La Chalupa-30: Lessons learned from a 30-day subsea mission analogue p 249 N94-33654

R

RADAR BEAMS
Estimation of the low-Earth-orbit debris population and distribution
[BTN-94-EIX94311322893] p 244 A94-60203
RADAR CROSS SECTIONS
Estimation of the low-Earth-orbit debris population and distribution
[BTN-94-EIX94311322893] p 244 A94-60203
RADIATION DOSAGE
Mars transfer vehicle using regolith as propellant
[BTN-94-EIX94311322895] p 244 A94-60201
RADIATION EFFECTS
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623
RADIATION SHIELDING
Mars transfer vehicle using regolith as propellant
[BTN-94-EIX94311322895] p 244 A94-60201
REACTOR SAFETY
HFE safety reviews of advanced nuclear power plant control rooms p 252 N94-33613
REAL TIME OPERATION
Fusion interfaces for tactical environments: An application of virtual reality technology p 252 N94-33619
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647
A volatile organic analyzer for Space Station: Description and evaluation of a gas chromatography/ ion mobility p 256 N94-33661
A self-organizing neural network architecture for auditory and speech perception with applications to acoustic and other temporal prediction problems
[AD-A277526] p 247 N94-33708
REFLEXES
Cellular analysis of the startle reflex
[AD-A278243] p 244 N94-33380
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637
REGOLITH
Mars transfer vehicle using regolith as propellant
[BTN-94-EIX94311322895] p 244 A94-60201
REMOTE CONTROL
EVA-SCRAM operations p 258 N94-34035
REMOTE SENSING
Assisting wine growers
[NASA-TM-109812] p 243 N94-33564
RETINAL IMAGES
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647
RIBONUCLEIC ACIDS
Phase-sensitive flow cytometry: New technology for analyzing biochemical, functional, and structural features in fluorochrome-labeled cells and particles
[DE94-003960] p 243 N94-33734
ROBOTICS
EVA-SCRAM operations p 258 N94-34035
ROCKET ENGINES
Mars transfer vehicle using regolith as propellant
[BTN-94-EIX94311322895] p 244 A94-60201
ROCKET PROPELLANTS
Mars transfer vehicle using regolith as propellant
[BTN-94-EIX94311322895] p 244 A94-60201

S

SACCADIC EYE MOVEMENTS
Eye movements and visual information processing
[AD-A278364] p 250 N94-33700
SAFETY
Safety concerns for first entry operations of orbiting spacecraft p 257 N94-33662
SAFETY DEVICES
Advanced eye or sensor protection and high speed variable optical attenuation system
[AD-D016150] p 257 N94-33781
SAFETY MANAGEMENT
HFE safety reviews of advanced nuclear power plant control rooms p 252 N94-33613
SCHEDULING
Reinforcement learning in scheduling p 251 N94-34045
SEATS
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
SELF ORGANIZING SYSTEMS
Workshop on Self-Determination in Developing and Evolving systems
[AD-A278367] p 250 N94-33737
SEMANTICS
Finding accurate frontiers: A knowledge-intensive approach to relational learning p 251 N94-34044
SENSORY PERCEPTION
The cognitive, perceptual, and neural bases of skilled performance
[AD-A277608] p 250 N94-33849
SIGNAL PROCESSING
Total hydrocarbon analysis by ion mobility spectrometry p 254 N94-33642
SIGNAL TRANSMISSION
A self-organizing neural network architecture for auditory and speech perception with applications to acoustic and other temporal prediction problems
[AD-A277526] p 247 N94-33708
SIGNS AND SYMPTOMS
The effectiveness of ground level post-flight 100 percent oxygen breathing as therapy for pain-only altitude Decompression Sickness (DCS) p 245 N94-33643
SKIN (ANATOMY)
Modeling heat exchange characteristics of long term space operations: Role of skin wettedness and exercise p 255 N94-33650
SOCIAL ISOLATION
La Chalupa-30: Lessons learned from a 30-day subsea mission analogue p 249 N94-33654
SOCKS
Comparative performance of a modified Space Shuttle Reentry Anti-G Suit (REAGS) with and without pressure socks p 255 N94-33655
SODIUM
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640
SOLDERING
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
SONIC BOOMS
Overview of NASA human response to sonic boom program p 244 N94-33499
SOUND LOCALIZATION
Pattern analysis based models of masking by spatially separated sound sources
[AD-A277882] p 247 N94-33779
SOUND WAVES
A self-organizing neural network architecture for auditory and speech perception with applications to acoustic and other temporal prediction problems
[AD-A277526] p 247 N94-33708
SPACE DEBRIS
Estimation of the low-Earth-orbit debris population and distribution
[BTN-94-EIX94311322893] p 244 A94-60203
SPACE ENVIRONMENT SIMULATION
Virtual reality as a human factors design analysis tool: Macro-ergonomic application validation and assessment of the Space Station Freedom payload control area p 252 N94-33620
A rapid algorithm for realistic human reaching and its use in a virtual reality system p 253 N94-33621
Shared virtual environments for aerospace training p 250 N94-34024
SPACE FLIGHT STRESS
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637
SPACE PSYCHOLOGY
La Chalupa-30: Lessons learned from a 30-day subsea *mission analogue* p 249 N94-33654
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 390)
[NASA-SP-7011(390)] p 248 N94-34602
SPACE SHUTTLE MISSIONS
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings p 245 N94-33639
SPACE SHUTTLE PAYLOADS
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
SPACE SHUTTLES
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
SPACE STATION FREEDOM
Virtual reality as a human factors design analysis tool: Macro-ergonomic application validation and assessment of the Space Station Freedom payload control area p 252 N94-33620
Continuous monitoring of bacterial attachment p 243 N94-33658
Safety concerns for first entry operations of orbiting spacecraft p 257 N94-33662
SPACE STATIONS
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
A volatile organic analyzer for Space Station: Description and evaluation of a gas chromatography/ ion mobility p 256 N94-33661
Unique methods for on-orbit structural repair, maintenance, and assembly p 257 N94-33663
SPACE TRANSPORTATION SYSTEM
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
SPACE TRANSPORTATION SYSTEM FLIGHTS
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
SPACEBORNE EXPERIMENTS
US experiment flown on the Soviet biosatellite Cosmos 1667
[NASA-TM-108803] p 259 N94-34951
SPACECRAFT CABIN ATMOSPHERES
Total hydrocarbon analysis by ion mobility spectrometry p 254 N94-33642
SPACECRAFT CONFIGURATIONS
A rapid algorithm for realistic human reaching and its use in a virtual reality system p 253 N94-33621
SPACECRAFT CONTAMINATION
Trace contaminant control simulation computer program, version 6.1
[NASA-TM-108457] p 258 N94-33973
SPACECRAFT DESIGN
Virtual reality as a human factors design analysis tool: Macro-ergonomic application validation and assessment of the Space Station Freedom payload control area p 252 N94-33620
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
SPACECRAFT ENVIRONMENTS
Safety concerns for first entry operations of orbiting spacecraft p 257 N94-33662
SPACECRAFT LAUNCHING
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
Emergency medical services p 245 N94-33644
KSC wildlife show
[NASA-TM-109808] p 243 N94-33770

SPACECRAFT MAINTENANCE
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
EVA-SCRAM operations p 258 N94-34035
SPACECREWS
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
Continuous monitoring of bacterial attachment p 243 N94-33658
Characterization of spacecraft humidity condensate p 256 N94-33659
Safety concerns for first entry operations of orbiting spacecraft p 257 N94-33662
SPECTROMETERS
Total hydrocarbon analysis by ion mobility spectrometry p 254 N94-33642
SPECTROSCOPIC ANALYSIS
Total hydrocarbon analysis by ion mobility spectrometry p 254 N94-33642
SPEECH
A self-organizing neural network architecture for auditory and speech perception with applications to acoustic and other temporal prediction problems
[AD-A277526] p 247 N94-33708
SPRAYERS
The effects of cold exposure on wet aircraft passengers: A review
[DOT/FAA/AM-94/10] p 258 N94-34389
STATISTICAL ANALYSIS
Formal design and evaluation of a variety of medical diagnostic programs
[PB94-149622] p 247 N94-34111
STOCHASTIC PROCESSES
Stochastic models of attention and search
[AD-A278538] p 249 N94-33674
Reinforcement learning in scheduling p 251 N94-34045
STRESS (PSYCHOLOGY)
Crisis and disaster research: A review
[PB94-149234] p 251 N94-34108
STRESS ANALYSIS
Personal cooling systems: Possibilities and limitations p 254 N94-33649
STROKE VOLUME
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637
STRUCTURAL MEMBERS
EVA-SCRAM operations p 258 N94-34035
SUBMERGING
A model for predicting central nervous system toxicity from hyperbaric oxygen exposure in man: Effects of immersion, exercise, and old and new data
[AD-A278348] p 247 N94-34005
SUPERSONIC FLIGHT
Overview of NASA human response to sonic boom program p 244 N94-33499
SUPINE POSITION
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings p 245 N94-33639
SURGEONS
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645
SURGERY
Telemedicine, virtual reality, and surgery p 245 N94-33641
Surgery applications of virtual reality p 247 N94-34025
SURGICAL INSTRUMENTS
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645
SWEAT
Modeling heat exchange characteristics of long term space operations: Role of skin wettedness and exercise p 255 N94-33650
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652
SWEAT COOLING
Modeling heat exchange characteristics of long term space operations: Role of skin wettedness and exercise p 255 N94-33650
SYNCOPE
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640
SYSTEMS ANALYSIS
Workshop on Self-Determination in Developing and Evolving systems
[AD-A278367] p 250 N94-33737
SYSTEMS ENGINEERING
Workshop on Self-Determination in Developing and Evolving systems
[AD-A278367] p 250 N94-33737
SYSTEMS INTEGRATION
Integration of the Molecular Sieve Oxygen Generating System (MSOGS) into the UH-60Q MEDEVAC Blackhawk
[AD-A277668] p 252 N94-33589

T

TELEOPERATORS
Telemedicine, virtual reality, and surgery p 245 N94-33641
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645
EVA-SCRAM operations p 258 N94-34035
TELEROBOTICS
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645
TEMPERATURE CONTROL
Personal cooling systems: Possibilities and limitations p 254 N94-33649
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653
TEMPERATURE EFFECTS
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707
TERRAIN
An ethnographic object-oriented analysis of explorer presence in a volcanic terrain environment: Claims and evidence
[NASA-TM-108823] p 252 N94-33608
TEXTURES
Visual motion perception and visual information processing
[AD-A278370] p 250 N94-33738
THERAPY
The effectiveness of ground level post-flight 100 percent oxygen breathing as therapy for pain-only altitude Decompression Sickness (DCS) p 245 N94-33643
THERMAL ANALYSIS
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652
THERMAL ENVIRONMENTS
Advanced integrated life support system update p 256 N94-33657
THERMOREGULATION
Hydration and blood volume effects on human thermoregulation in the heat: Space applications p 246 N94-33651
TOXICITY
A model for predicting central nervous system toxicity from hyperbaric oxygen exposure in man: Effects of immersion, exercise, and old and new data
[AD-A278348] p 247 N94-34005
TRACE CONTAMINANTS
Safety concerns for first entry operations of orbiting spacecraft p 257 N94-33662
Trace contaminant control simulation computer program, version 8.1
[NASA-TM-108457] p 258 N94-33973
TRAINING DEVICES
Telemedicine, virtual reality, and surgery p 245 N94-33641
TRAINING SIMULATORS
Virtual reality as a human factors design analysis tool: Macro-ergonomic application validation and assessment of the Space Station Freedom payload control area p 252 N94-33620
Shared virtual environments for aerospace training p 250 N94-34024
TREADMILLS
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen p 244 N94-33638
TRUSSES
Unique methods for on-orbit structural repair, maintenance, and assembly p 257 N94-33663

U

UNDERWATER PHOTOGRAPHY
Evaluation of lens distortion errors using an underwater camera system for video-based motion analysis
[NASA-TM-104795] p 257 N94-33957
UNDERWATER RESEARCH LABORATORIES
La Chalupa-30: Lessons learned from a 30-day subsea mission analogue p 249 N94-33654

V

VASOCONSTRICTION
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637
VIDEO DATA
Evaluation of lens distortion errors using an underwater camera system for video-based motion analysis
[NASA-TM-104795] p 257 N94-33957
VINEYARDS
Assisting wine growers
[NASA-TM-109812] p 243 N94-33564
VIRTUAL REALITY
An ethnographic object-oriented analysis of explorer presence in a volcanic terrain environment: Claims and evidence
[NASA-TM-108823] p 252 N94-33608
Fusion interfaces for tactical environments: An application of virtual reality technology p 252 N94-33619
Virtual reality as a human factors design analysis tool: Macro-ergonomic application validation and assessment of the Space Station Freedom payload control area p 252 N94-33620
A rapid algorithm for realistic human reaching and its use in a virtual reality system p 253 N94-33621
Telemedicine, virtual reality, and surgery p 245 N94-33641
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645
Shared virtual environments for aerospace training p 250 N94-34024
Surgery applications of virtual reality p 247 N94-34025
VISUAL ACUITY
Effects of lighting and task parameters on visual acuity and performance
[ISBN-9-51-221845-3] p 251 N94-34699
VISUAL DISCRIMINATION
Effects of lighting and task parameters on visual acuity and performance
[ISBN-9-51-221845-3] p 251 N94-34699
VISUAL FIELDS
Anthropometric accommodation in USAF cockpits p 253 N94-33630
Eye movements and visual information processing
[AD-A278364] p 250 N94-33700
VISUAL PERCEPTION
Visual motion perception and visual information processing
[AD-A278530] p 248 N94-33595
Stochastic models of attention and search
[AD-A278538] p 249 N94-33674
Eye movements and visual information processing
[AD-A278364] p 250 N94-33700
Visual motion perception and visual information processing
[AD-A278370] p 250 N94-33738
VISUAL STIMULI
Visual motion perception and visual information processing
[AD-A278370] p 250 N94-33738

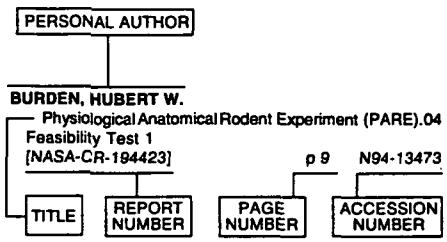
W

WASTE WATER
Characterization of spacecraft humidity condensate p 256 N94-33659
WATER
The effects of cold exposure on wet aircraft passengers: A review
[DOT/FAA/AM-94/10] p 258 N94-34389
WATER IMMERSION
A model for predicting central nervous system toxicity from hyperbaric oxygen exposure in man: Effects of immersion, exercise, and old and new data
[AD-A278348] p 247 N94-34005
WATER MANAGEMENT
Characterization of spacecraft humidity condensate p 256 N94-33659
WATER QUALITY
Characterization of spacecraft humidity condensate p 256 N94-33659
Computation of iodine species concentrations in water p 256 N94-33660
WATER RECLAMATION
Characterization of spacecraft humidity condensate p 256 N94-33659
Computation of iodine species concentrations in water p 256 N94-33660
WEAPON SYSTEMS
Fusion interfaces for tactical environments: An application of virtual reality technology p 252 N94-33619

WEIGHTLESSNESS
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
Modeling heat exchange characteristics of long term space operations: Role of skin wettedness and exercise p 255 N94-33650
WELDED JOINTS
Unique methods for on-orbit structural repair, maintenance, and assembly p 257 N94-33663
WELDING
Unique methods for on-orbit structural repair, maintenance, and assembly p 257 N94-33663
WETTING
The effects of cold exposure on wet aircraft passengers: A review
[DOT/FAA/AM-94/10] p 258 N94-34389
WILDLIFE
KSC wildlife show
[NASA-TM-109808] p 243 N94-33770
WORK CAPACITY
Expanding the pilot's envelope p 258 N94-34627
WORK-REST CYCLE
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652
WORKLOADS (PSYCHOPHYSIOLOGY)
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627
Expanding the pilot's envelope p 258 N94-34627
Man-machine Integration Design and Analysis System (MIDAS) Task Loading Model (TLM) experimental and software detailed design report
[NASA-CR-177640] p 258 N94-34706
WORKSTATIONS
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623
WOUND HEALING
Effect of barbiturates and hyperoxia on lipid peroxidation in hypoxic neurons
[AD-A278467] p 244 N94-33545

PERSONAL AUTHOR INDEX

Typical Personal Author Index Listing



Listings in this index are arranged alphabetically by personal author. The title of the document is used to provide a brief description of the subject matter. The report number helps to indicate the type of document (e.g., NASA report, translation, NASA contractor report). The page and accession numbers are located beneath and to the right of the title. Under any one author's name the accession numbers are arranged in sequence.

A

AGUILAR, RONALD D.
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624

ALCAZAR, D. G.
Evaluation of pulsed Doppler bubble detection
[AD-A277920] p 248 N94-34695

ALDRIDGE, ANN
A rapid algorithm for realistic human reaching and its use in a virtual reality system p 253 N94-33621

ALFRIEND, KYLE T.
Estimation of the low-Earth-orbit debris population and distribution
[BTN-94-EIX94311322893] p 244 A94-60203

ALTSCHULER, BRUCE R.
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645

ANDERSON, RAY
Unique methods for on-orbit structural repair, maintenance, and assembly p 257 N94-33663

AOYAGI, YUKITOSHI
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707

ARMSTRONG, LAWRENCE E.
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640

ASKEW, ELDON W.
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640

B

BAGIAN, L.
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653

BILLICA, ROGER
Emergency medical services p 245 N94-33644

The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647

BROACH, DANA
Validity of the air traffic control specialist nonradar screen as a predictor of performance in radar-based air traffic control training
[DOT/FAA/AM-94/9] p 251 N94-34210

BRUNK, CLIFFORD
Finding accurate frontiers: A knowledge-intensive approach to relational learning p 251 N94-34044

BURTON, RUSSELL R.
Gravity, the third dimension of life support in space p 254 N94-33635

C

CAPUTO, MICHAEL
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647

CARETTI, DAVID M.
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640

CHANDLER, MICHAEL
Emergency medical services p 245 N94-33644

CHARLES, J.
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637

Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653

CHARLES, STEVE
Telemedicine, virtual reality, and surgery p 245 N94-33641

COHEN, MICHAEL
A self-organizing neural network architecture for auditory and speech perception with applications to acoustic and other temporal prediction problems
[AD-A277526] p 247 N94-33708

CORDERO-MONTALVO, ORLANDO
Integration of the Molecular Sieve Oxygen Generating System (MSOGS) into the UH-60Q MEDEVAC Blackhawk
[AD-A277668] p 252 N94-33589

COWINGS, PATRICIA S.
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622

CROSS, JOHN H.
Total hydrocarbon analysis by ion mobility spectrometry p 254 N94-33642

CUSHMAN, WILLIAM B.
Advanced eye or sensor protection and high speed variable optical attenuation system
[AD-D016150] p 257 N94-33781

D

DAVIS, MICHAEL
Cellular analysis of the startle reflex
[AD-A278243] p 244 N94-33380

DEMBOSKI, JOHN T.
The effectiveness of ground level post-flight 100 percent oxygen breathing as therapy for pain-only altitude Decompression Sickness (DCS) p 245 N94-33643

DIAZ, MANUEL F.
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627

DIETTERICH, TOM G.
Reinforcement learning in scheduling p 251 N94-34045

DINGES, DAVID F.
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624

DUSSACK, T.
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637

E

EASTMAN, CHARMANE I.
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623

ENDANDER, A.
Crisis and disaster research: A review
[PB94-149234] p 251 N94-34108

ENGLAND, HARVEY M.
The effects of cold exposure on wet aircraft passengers: A review
[DOT/FAA/AM-94/10] p 258 N94-34389

F

FILLOTSON, BRIAN
Mars transfer vehicle using regolith as propellant
[BTN-94-EIX94311322895] p 244 A94-60201

FISCHER, MICHELE D.
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen p 244 N94-33638

Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings p 245 N94-33639

FLANAGAN, DAVID T.
Computation of iodine species concentrations in water p 256 N94-33660

FLANIGAN, LEE A.
EVA-SCRAM operations p 258 N94-34035

FLETCHER, LAUREN
Evaluation of lens distortion errors using an underwater camera system for video-based motion analysis
[NASA-TM-104795] p 257 N94-33957

FOLEN, RAYMOND A.
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622

FORTNEY, S.
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637

Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653

FRANCESCONI, RALPH P.
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640

FRITSCH, I.
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653

FUSON, PHIL
Unique methods for on-orbit structural repair, maintenance, and assembly p 257 N94-33663

G

GARNER, ROBERT P.
The effects of cold exposure on wet aircraft passengers: A review
[DOT/FAA/AM-94/10] p 258 N94-34389

GIBSON, C. ROBERT
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647

GILKEY, ROBERT H.
Pattern analysis based models of masking by spatially separated sound sources
[AD-A277882] p 247 N94-33779

GILLEN, KELLY A.
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624

GOLDSBY, MICHAEL
A rapid algorithm for realistic human reaching and its use in a virtual reality system p 253 N94-33621

GOMES, MARIE E.
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628

GONZALEZ, RICHARD R.
Modeling heat exchange characteristics of long term space operations: Role of skin wettedness and exercise p 255 N94-33650

Hydration and blood volume effects on human thermoregulation in the heat: Space applications p 246 N94-33651

Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652

GREGORY, KEVIN B.
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
GROSSBERG, STEPHEN
A self-organizing neural network architecture for auditory and speech perception with applications to acoustic and other temporal prediction problems
[AD-A277526] p 247 N94-33708
The cognitive, perceptual, and neural bases of skilled performance
[AD-A277608] p 250 N94-33849
Neural models of motion perception
[AD-A278362] p 250 N94-33857

H

HAAS, MICHAEL W.
Fusion interfaces for tactical environments: An application of virtual reality technology p 252 N94-33619
HALE, JOSEPH P.
Virtual reality as a human factors design analysis tool: Macro-ergonomic application validation and assessment of the Space Station Freedom payload control area p 252 N94-33620
HALONEN, LIISA
Effects of lighting and task parameters on visual acuity and performance
[ISBN-9-51-221845-3] p 251 N94-34699
HAMILTON, BRUCE E.
Expanding the pilot's envelope p 258 N94-34627
HARABIN, A. L.
A model for predicting central nervous system toxicity from hyperbaric oxygen exposure in man: Effects of immersion, exercise, and old and new data
[AD-A278348] p 247 N94-34005
HAYES, BENITA C.
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623
HEAPS, CRISTINE L.
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen p 244 N94-33638
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings p 245 N94-33639
HIGHT, JOHN
Integration of the Molecular Sieve Oxygen Generating System (MSOGS) into the UH-60Q MEDEVAC Blackhawk
[AD-A277668] p 252 N94-33589
HINES, JOHN W.
US experiment flown on the Soviet biosatellite Cosmos 1667
[NASA-TM-108803] p 259 N94-34951
HISERT, GLEN L.
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622
HOLDEN, KRITINA
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
HOLLAND, ALBERT W.
La Chalupa-30: Lessons learned from a 30-day subsea mission analogue p 249 N94-33654
HOMER, L. D.
A model for predicting central nervous system toxicity from hyperbaric oxygen exposure in man: Effects of immersion, exercise, and old and new data
[AD-A278348] p 247 N94-34005
HUBBARD, ROGER W.
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640
HUNTER, NORWOOD
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647

J

JAMES, JOHN T.
Total hydrocarbon analysis by ion mobility spectrometry p 254 N94-33642
A volatile organic analyzer for Space Station: Description and evaluation of a gas chromatography/ ion mobility p 256 N94-33661
Safety concerns for first entry operations of orbiting spacecraft p 257 N94-33662
JOLLY, W. D.
Evaluation of pulsed Doppler bubble detection
[AD-A277920] p 248 N94-34695

K

KELLAR, MICHAEL A.
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622
KELLY, SEAN M.
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
KIMBROUGH, ANDREW G.
EVA-SCRAM operations p 258 N94-34035
KLUTE, GLENN K.
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
Evaluation of lens distortion errors using an underwater camera system for video-based motion analysis
[NASA-TM-104795] p 257 N94-33957
KOEING, D. W.
Continuous monitoring of bacterial attachment p 243 N94-33658
KOWLER, EILEEN
Eye movements and visual information processing
[AD-A278364] p 250 N94-33700
KRUTZ, R. W., JR.
Comparative performance of a modified Space Shuttle Reentry Anti-G Suit (REAGS) with and without pressure socks p 255 N94-33655
KUMAR, V.
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653
KUPERSTEIN, MICHAEL
Workshop on Self-Determination in Developing and Evolving systems
[AD-A278367] p 250 N94-33737
KWUN, HEGEON
Evaluation of pulsed Doppler bubble detection
[AD-A277920] p 248 N94-34695

L

LARSSON, G.
Crisis and disaster research: A review
[PB94-149234] p 251 N94-34108
LEWIS, D. LAURIE
Estimation of the low-Earth-orbit debris population and distribution
[BTN-94-EIX94311322893] p 244 A94-60203
LIMERO, THOMAS F.
Total hydrocarbon analysis by ion mobility spectrometry p 254 N94-33642
A volatile organic analyzer for Space Station: Description and evaluation of a gas chromatography/ ion mobility p 256 N94-33661
Safety concerns for first entry operations of orbiting spacecraft p 257 N94-33662
LIND, STEPHANIE
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628
LOFTIN, R. BOWEN
Shared virtual environments for aerospace training p 250 N94-34024

M

MADER, THOMAS
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647
MAIDA, JAMES
A rapid algorithm for realistic human reaching and its use in a virtual reality system p 253 N94-33621
MANNING, CAROL A.
Validity of the air traffic control specialist nonradar screen as a predictor of performance in radar-based air traffic control training
[DOT/FAA/AM-94/9] p 251 N94-34210
MANUEL, F. KEITH
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647
MARSHALL, J. A.
Comparative performance of a modified Space Shuttle Reentry Anti-G Suit (REAGS) with and without pressure socks p 255 N94-33655
MCCLURE, SIDNEY R.
EVA-SCRAM operations p 258 N94-34035
MCCORMACK, PERCIVAL D.
Telemedicine, virtual reality, and surgery p 245 N94-33641
MCGREEVY, MICHAEL W.
An ethnographic object-oriented analysis of explorer presence in a volcanic terrain environment: Claims and evidence
[NASA-TM-108823] p 252 N94-33608
MCLELLAN, TOM M.
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707
MEEHAN, RICHARD
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647
MEHM, WILLIAM J.
Effect of barbiturates and hyperoxia on lipid peroxidation in hypoxic neurons
[AD-A278467] p 244 N94-33545
MILLER, DONNA L.
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
MINGOLLA, ENNIO
Neural models of motion perception
[AD-A278362] p 250 N94-33857
MISHRA, S. K.
Continuous monitoring of bacterial attachment p 243 N94-33658
MOORE, ROBERT J.
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640
MOUNT, FRANCES
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
MUCKLE, SUSAN
Characterization of spacecraft humidity condensate p 256 N94-33659
MUDGETT, PAUL D.
Computation of iodine species concentrations in water p 256 N94-33660

N

NAKAGAWARA, VAN B.
The effects of cold exposure on wet aircraft passengers: A review
[DOT/FAA/AM-94/10] p 258 N94-34389
NUNNELEY, SARAH A.
Personal cooling systems: Possibilities and limitations p 254 N94-33649

O

OHARA, JOHN
HFE safety reviews of advanced nuclear power plant control rooms p 252 N94-33613
OK, DOKYEONG
Reinforcement learning in scheduling p 251 N94-34045
ONEAL, MICHAEL
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634

P

PANDOLF, KENT B.
Hydration and blood volume effects on human thermoregulation in the heat: Space applications p 246 N94-33651
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652
PANDYA, ABHILASH
A rapid algorithm for realistic human reaching and its use in a virtual reality system p 253 N94-33621
PAZZANI, MICHAEL
Finding accurate frontiers: A knowledge-intensive approach to relational learning p 251 N94-34044
PEPPER, L.
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653
PERRY, J. L.
Trace contaminant control simulation computer program, version 8.1
[NASA-TM-108457] p 258 N94-33973
PIERSON, D. L.
Continuous monitoring of bacterial attachment p 243 N94-33658
PILMANIS, ANDREW A.
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings p 245 N94-33639
The effectiveness of ground level post-flight 100 percent oxygen breathing as therapy for pain-only altitude Decompression Sickness (DCS) p 245 N94-33643
POLINER, JEFFREY
Evaluation of lens distortion errors using an underwater camera system for video-based motion analysis
[NASA-TM-104795] p 257 N94-33957

R

RAY, P. M.
Enzymology and molecular biology of cell wall biosynthesis
[DE94-008585] p 243 N94-34008
RIPLEY, G. L.
Comparative performance of a modified Space Shuttle Reentry Anti-G Suit (REAGS) with and without pressure socks p 255 N94-33655
ROSEKIND, MARK R.
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
ROSEN, JOSEPH
Surgery applications of virtual reality
p 247 N94-34025

S

SAUER, RICHARD L.
Characterization of spacecraft humidity condensate
p 256 N94-33659
Computation of iodine species concentrations in water
p 256 N94-33660
SAWIN, C. F.
Comparative performance of a modified Space Shuttle Reentry Anti-G Suit (REAGS) with and without pressure socks p 255 N94-33655
SAWKA, MICHAEL N.
Hydration and blood volume effects on human thermoregulation in the heat: Space applications
p 246 N94-33651
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652
SCHULTZ, JOHN R.
Characterization of spacecraft humidity condensate
p 256 N94-33659
Computation of iodine species concentrations in water
p 256 N94-33660
SCOGGINS, TERRELL E.
Current and future issues in USAF full pressure suit research and development p 255 N94-33656
SCOTT, CAROL J.
Automating the training development process for mission flight operations p 249 N94-33625
SHEPHARD, ROY J.
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707
SHEPHERD, KEVIN P.
Overview of NASA human response to sonic boom program p 244 N94-33499
SICONOLFI, S.
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653
SILS, INGRID V.
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640
SKIDMORE, MICHAEL G.
US experiment flown on the Soviet biosatellite Cosmos 1667
[NASA-TM-108803] p 259 N94-34951
SMITH, ROY M.
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
SPERLING, GEORGE
Visual motion perception and visual information processing
[AD-A278530] p 248 N94-33595
Visual motion perception and visual information processing
[AD-A278370] p 250 N94-33738
STAMPER, R.
Formal design and evaluation of a variety of medical diagnostic programs
[PB94-149622] p 247 N94-34111
STAVELAND, LOWELL
Man-machine Integration Design and Analysis System (MIDAS) Task Loading Model (TLM) experimental and software detailed design report
[NASA-CR-177640] p 258 N94-34706
STEINKAMP, J. A.
Phase-sensitive flow cytometry: New technology for analyzing biochemical, functional, and structural features in fluorochrome-labeled cells and particles
[DE94-003960] p 243 N94-33734
STEWART, KAREN T.
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623
STOYCOS, LARA E.
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
STROSCHEIN, LEANDER A.
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652
SURVANSHI, S. S.
A model for predicting central nervous system toxicity from hyperbaric oxygen exposure in man: Effects of immersion, exercise, and old and new data
[AD-A278348] p 247 N94-34005
SZLYK, PATRICIA C.
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640

T

TADEPALLI, PRASAD
Reinforcement learning in scheduling
p 251 N94-34045
TAKAMOTO, NEAL
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627
TAMIR, DAVID
EVA-SCRAM operations p 258 N94-34035
TARTARINI, KIM A.
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640
TAYLOR, GERALD
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647
TODD, B. S.
Formal design and evaluation of a variety of medical diagnostic programs
[PB94-149622] p 247 N94-34111
TOSCANO, WILLIAM B.
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622

V

VANDERARK, STEVE
La Chalupa-30: Lessons learned from a 30-day subsea mission analogue p 249 N94-33654
VOSS, MARK
Shared virtual environments for aerospace training
p 250 N94-34024

W

WALIGORA, J.
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653
WALLENIUS, C.
Crisis and disaster research: A review
[PB94-149234] p 251 N94-34108
WEBB, JAMES T.
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen
p 244 N94-33638
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings
p 245 N94-33639
WEDDENDORF, BRUCE C.
Prosthetic elbow joint
[NASA-CASE-MFS-28707-1] p 259 N94-35115
WEEKS, JACK L.
EVA-SCRAM operations p 258 N94-34035
WHITLEY, PHILLIP E.
The US Navy/Canadian DCIEM research initiative on pressure breathing physiology p 254 N94-33636
Advanced integrated life support system update
p 256 N94-33657
WILCOX, BRUCE C.
The effects of cold exposure on wet aircraft passengers: *A review*
[DOT/FAA/AM-94/10] p 258 N94-34389
WILSON, STEVEN H.
Safety concerns for first entry operations of orbiting spacecraft p 257 N94-33662
WOLF, STEVE
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
WOOD, JOANNA
La Chalupa-30: Lessons learned from a 30-day subsea mission analogue p 249 N94-33654
WOOD, M.
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637
WOOLFORD, BARBARA
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627

Y

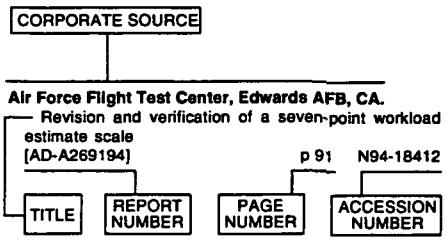
YANTIS, STEVEN
Stochastic models of attention and search
[AD-A278538] p 249 N94-33674

Z

ZEHNER, GREGORY F.
Anthropometric accommodation in USAF cockpits
p 253 N94-33630
ZHANG, WEI
Reinforcement learning in scheduling
p 251 N94-34045

CORPORATE SOURCE INDEX

Typical Corporate Source Index Listing



Listings in this index are arranged alphabetically by corporate source. The title of the document is used to provide a brief description of the subject matter. The page number and the accession number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number is also included as an aid in identifying the document.

A

Aerospace Medical Research Labs., Brooks AFB, TX.
Gravity, the third dimension of life support in space p 254 N94-33635
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen p 244 N94-33638
The effectiveness of ground level post-flight 100 percent oxygen breathing as therapy for pain-only altitude Decompression Sickness (DCS) p 245 N94-33643
Personal cooling systems: Possibilities and limitations p 254 N94-33649
Current and future issues in USAF full pressure suit research and development p 255 N94-33656

Aerospace Medical Research Labs., Wright-Patterson AFB, OH.
Fusion interfaces for tactical environments: An application of virtual reality technology p 252 N94-33619
A human factors evaluation using tools for automated knowledge engineering p 253 N94-33628
Anthropometric accommodation in USAF cockpits p 253 N94-33630

Armed Forces Inst. of Pathology, Washington, DC.
Effect of barbiturates and hyperoxia on lipid peroxidation in hypoxic neurons
[AD-A278467] p 244 N94-33545

Army Inst. of Dental Research, Fort Meade, MD.
Quantitative 3-D imaging topogrammetry for telemedicine applications p 246 N94-33645

Army Research Inst. of Environmental Medicine, Natick, MA.
Orthostatic responses to dietary sodium restriction during heat acclimation p 245 N94-33640
Modeling heat exchange characteristics of long term space operations: Role of skin wettedness and exercise p 255 N94-33650
Hydration and blood volume effects on human thermoregulation in the heat: Space applications p 246 N94-33651
Prediction modeling of physiological responses and human performance in the heat with application to space operations p 249 N94-33652

B

Boston Univ., MA.
A self-organizing neural network architecture for auditory and speech perception with applications to acoustic and other temporal prediction problems
[AD-A277526] p 247 N94-33708
The cognitive, perceptual, and neural bases of skilled performance
[AD-A277608] p 250 N94-33849
Neural models of motion perception
[AD-A278362] p 250 N94-33857

Brookhaven National Lab., Upton, NY.
HFE safety reviews of advanced nuclear power plant control rooms p 252 N94-33613

C

California Univ., Irvine, CA.
Finding accurate frontiers: A knowledge-intensive approach to relational learning p 251 N94-34044

D

Dartmouth-Hitchcock Medical Center, Lebanon, NH.
Surgery applications of virtual reality p 247 N94-34025

Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707

Department of the Navy, Washington, DC.
Advanced eye or sensor protection and high speed variable optical attenuation system
[AD-D016150] p 257 N94-33781

F

Federal Aviation Administration, Oklahoma City, OK.
Validity of the air traffic control specialist nonradar screen as a predictor of performance in radar-based air traffic control training
[DOT/FAA/AM-94/9] p 251 N94-34210
The effects of cold exposure on wet aircraft passengers: A review
[DOT/FAA/AM-94/10] p 258 N94-34389

H

Helsinki Univ. of Technology, Espoo (Finland).
Effects of lighting and task parameters on visual acuity and performance
[ISBN-9-51-221845-3] p 251 N94-34699

Houston Univ., TX.
Shared virtual environments for aerospace training p 250 N94-34024

J

Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA.
Automating the training development process for mission flight operations p 249 N94-33625

Johns Hopkins Univ., Baltimore, MD.
Stochastic models of attention and search
[AD-A278538] p 249 N94-33674

K

Krug Life Sciences, Inc., San Antonio, TX.
Dual-cycle ergometry as an exercise modality during prebreathe with 100 percent oxygen p 244 N94-33638
Exercise with prebreathe appears to increase protection from decompression sickness: Preliminary findings p 245 N94-33639

L

Los Alamos National Lab., NM.
Phase-sensitive flow cytometry: New technology for analyzing biochemical, functional, and structural features in fluorochrome-labeled cells and particles
[DE94-003960] p 243 N94-33734

M

McDonnell Aircraft Co., Saint Louis, MO.
Unique methods for on-orbit structural repair, maintenance, and assembly p 257 N94-33663

N

National Aeronautics and Space Administration, Washington, DC.
Assisting wine growers
[NASA-TM-109812] p 243 N94-33564
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 390)
[NASA-SP-7011(390)] p 248 N94-34602

National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
An ethnographic object-oriented analysis of explorer presence in a volcanic terrain environment: Claims and evidence
[NASA-TM-108823] p 252 N94-33608
Autogenic-feedback training improves pilot performance during emergency flying conditions p 248 N94-33622
US experiment flown on the Soviet biosatellite Cosmos 1667
[NASA-TM-108803] p 259 N94-34951

National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
EVA-SCRAM operations p 258 N94-34035

National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, FL.
KSC wildlife show
[NASA-TM-109808] p 243 N94-33770

National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
A rapid algorithm for realistic human reaching and its use in a virtual reality system p 253 N94-33621
Flight controller alertness and performance during MOD shiftwork operations p 249 N94-33624
Task network models in the prediction of workload imposed by extravehicular activities during the Hubble Space Telescope servicing mission p 253 N94-33627
An overview of Space Shuttle anthropometry and biomechanics research with emphasis on STS/Mir recumbent seat system design p 253 N94-33629
A comparison of paper and computer procedures in a Shuttle flight environment p 253 N94-33634
Response to graded Lower Body Negative Pressure (LBNP) after space flight p 244 N94-33637
Total hydrocarbon analysis by ion mobility spectrometry p 254 N94-33642
Emergency medical services p 245 N94-33644
The Portable Dynamic Fundus Instrument: Uses in telemedicine and research p 246 N94-33647
Evaluation of a liquid cooling garment as a component of the Launch and Entry Suit (LES) p 255 N94-33653
La Chalupa-30: Lessons learned from a 30-day subsea mission analogue p 249 N94-33654
Comparative performance of a modified Space Shuttle Reentry Anti-G Suit (REAGS) with and without pressure socks p 255 N94-33655

Continuous monitoring of bacterial attachment
p 243 N94-33658
Characterization of spacecraft humidity condensate
p 256 N94-33659
Computation of iodine species concentrations in water
p 256 N94-33660
A volatile organic analyzer for Space Station: Description and evaluation of a gas chromatography/ ion mobility
p 256 N94-33661
Safety concerns for first entry operations of orbiting spacecraft p 257 N94-33662
Evaluation of lens distortion errors using an underwater camera system for video-based motion analysis
[NASA-TM-104795] p 257 N94-33957

National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Overview of NASA human response to sonic boom program p 244 N94-33499

National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
Virtual reality as a human factors design analysis tool: Macro-ergonomic application validation and assessment of the Space Station Freedom payload control area
p 252 N94-33620
Implementing bright light treatment for MSFC payload operations shiftworkers p 248 N94-33623
Trace contaminant control simulation computer program, version 8.1
[NASA-TM-108457] p 258 N94-33973
Prosthetic elbow joint
[NASA-CASE-MFS-28707-1] p 259 N94-35115

National Defence Research Establishment, Stockholm (Sweden).
Crisis and disaster research: A review
[PB94-149234] p 251 N94-34108

Naval Air Warfare Center, China Lake, CA.
Telemedicine, virtual reality, and surgery
p 245 N94-33641

Naval Air Warfare Center, Warminster, PA.
The US Navy/Canadian DCIEM research initiative on pressure breathing physiology p 254 N94-33636
Advanced integrated life support system update
p 256 N94-33657

Naval Medical Research and Development Command, Bethesda, MD.
A model for predicting central nervous system toxicity from hyperbaric oxygen exposure in man: Effects of immersion, exercise, and old and new data
[AD-A278348] p 247 N94-34005

New York Univ., New York.
Visual motion perception and visual information processing
[AD-A278530] p 248 N94-33595
Visual motion perception and visual information processing
[AD-A278370] p 250 N94-33738

O

Oregon State Univ., Corvallis.
Reinforcement learning in scheduling
p 251 N94-34045

Oxford Univ. (England).
Formal design and evaluation of a variety of medical diagnostic programs
[PB94-149622] p 247 N94-34111

R

Rutgers - The State Univ., New Brunswick, NJ.
Eye movements and visual information processing
[AD-A278364] p 250 N94-33700

S

Serv-Air, Inc., Lexington, KY.
Integration of the Molecular Sieve Oxygen Generating System (MSOGS) into the UH-60Q MEDEVAC Blackhawk
[AD-A277668] p 252 N94-33589

Sikorsky Aircraft, Stratford, CT.
Expanding the pilot's envelope p 258 N94-34627

Southwest Research Inst., San Antonio, TX.
Evaluation of pulsed Doppler bubble detection
[AD-A277920] p 248 N94-34695

Stanford Univ., CA.
Enzymology and molecular biology of cell wall biosynthesis
[DE94-008585] p 243 N94-34008

Sterling Software, Inc., Palo Alto, CA.
Man-machine Integration Design and Analysis System (MIDAS) Task Loading Model (TLM) experimental and software detailed design report
[NASA-CR-177640] p 258 N94-34706

Symbus Technology, Inc., Waltham, MA.
Workshop on Self-Determination in Developing and Evolving systems
[AD-A278367] p 250 N94-33737

W

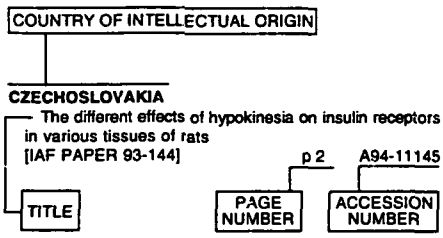
Wright State Univ., Dayton, OH.
Pattern analysis based models of masking by spatially separated sound sources
[AD-A277882] p 247 N94-33779

Y

Yale Univ., New Haven, CT.
Cellular analysis of the startle reflex
[AD-A278243] p 244 N94-33380

FOREIGN TECHNOLOGY INDEX

Typical Foreign Technology Index Listing



Listings in this index are arranged alphabetically by country of intellectual origin. The title of the document is used to provide a brief description of the subject matter. The page number and accession number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number is also included as an aid in identifying the document.

C

CANADA
Effects of heat acclimation on heat-exercise tolerance in untrained and endurance-trained men wearing NBC protective clothing
[AD-A277522] p 257 N94-33707

F

FINLAND
Effects of lighting and task parameters on visual acuity and performance
[ISBN-9-51-221845-3] p 251 N94-34699

S

SWEDEN
Crisis and disaster research: A review
[PB94-149234] p 251 N94-34108

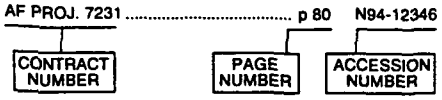
U

UNITED KINGDOM
Formal design and evaluation of a variety of medical diagnostic programs
[PB94-149622] p 247 N94-34111

FOREIGN

CONTRACT NUMBER INDEX

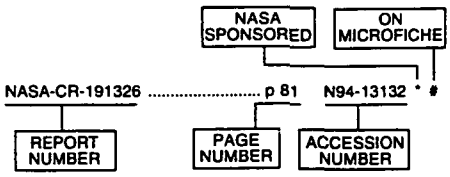
Typical Contract Number Index Listing



Listings in this index are arranged alphanumerically by contract number. Under each contract number the accession numbers denoting documents that have been produced as a result of research done under the contract are shown. The accession number denotes the number by which the citation is identified in the abstract section. Preceding the accession number is the page number on which the citation may be found.

AF PROJ. 7930 ..... p 248 N94-34695
AF-AFOSR-0175-90 ..... p 250 N94-33849
AF-AFOSR-0178-91 ..... p 248 N94-33595
p 250 N94-33738
AF-AFOSR-0289-91 ..... p 247 N94-33779
AF-AFOSR-0342-91 ..... p 250 N94-33700
DA PROJ. 3O4-63807-D-836 ..... p 252 N94-33589
DE-FG03-91ER-20048 ..... p 243 N94-34008
DLA900-84-C-0910 ..... p 248 N94-34695
F33615-89-C-0603 ..... p 245 N94-33639
F33615-92-C-0018 ..... p 245 N94-33639
F49620-92-J-0166 ..... p 244 N94-33545
F49620-92-J-0186 ..... p 249 N94-33674
F49620-92-J-0225 ..... p 247 N94-33708
F49620-92-J-0300 ..... p 244 N94-33380
F49620-92-J-0334 ..... p 250 N94-33857
F49620-94-C-0011 ..... p 250 N94-33737
MIPR-FQ7624-89-000001 ..... p 248 N94-34695
MIPR-92MM2594 ..... p 252 N94-33589
NAGW-1293 ..... p 251 N94-34045
NASA ORDER T-82170 ..... p 245 N94-33639
NAS2-13210 ..... p 258 N94-34706
NCC2-599 ..... p 249 N94-33624
RTOP 199-70-12 ..... p 259 N94-34951
RTOP 506-59-65 ..... p 252 N94-33608
W-7405-ENG-36 ..... p 243 N94-33734

Typical Report Number Index Listing



Listings in this index are arranged alphanumerically by report number. The page number indicates the page on which the citation is located. The accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

A-94032 ..... p 259 N94-34951 * #
A-94080 ..... p 258 N94-34706 * #
A-94083 ..... p 252 N94-33608 * #

AD-A277522 ..... p 257 N94-33707
AD-A277526 ..... p 247 N94-33708
AD-A277608 ..... p 250 N94-33849
AD-A277668 ..... p 252 N94-33589
AD-A277882 ..... p 247 N94-33779
AD-A277920 ..... p 248 N94-34695
AD-A278243 ..... p 244 N94-33380 #
AD-A278348 ..... p 247 N94-34005 #
AD-A278362 ..... p 250 N94-33857
AD-A278364 ..... p 250 N94-33700
AD-A278367 ..... p 250 N94-33737
AD-A278370 ..... p 250 N94-33738
AD-A278467 ..... p 244 N94-33545 #
AD-A278530 ..... p 248 N94-33595
AD-A278538 ..... p 249 N94-33674 #

AD-D016150 ..... p 257 N94-33781

AFOSR-94-0067TR ..... p 250 N94-33849
AFOSR-94-0107TR ..... p 247 N94-33708
AFOSR-94-0137TR ..... p 247 N94-33779
AFOSR-94-0142TR ..... p 250 N94-33857
AFOSR-94-0143TR ..... p 250 N94-33700
AFOSR-94-0159TR ..... p 250 N94-33738
AFOSR-94-0188TR ..... p 250 N94-33737
AFOSR-94-0205TR ..... p 248 N94-33595
AFOSR-94-0220TR ..... p 244 N94-33545 #
AFOSR-94-0224TR ..... p 244 N94-33380 #
AFOSR-94-0247TR ..... p 249 N94-33674 #

AL/CF-TP-1994-0006 ..... p 248 N94-34695

BTN-94-EIX94311322893 ..... p 244 A94-60203
BTN-94-EIX94311322895 ..... p 244 A94-60201

CONF-940341-2 ..... p 243 N94-33734 #

DCIEM-93-47 ..... p 257 N94-33707

DE94-003960 ..... p 243 N94-33734 #
DE94-008585 ..... p 243 N94-34008 #

DOE/ER-20048/2 ..... p 243 N94-34008 #

DOT/FAA/AM-94/10 ..... p 258 N94-34389 #
DOT/FAA/AM-94/9 ..... p 251 N94-34210 #

ETN-94-96054 ..... p 251 N94-34699 #

FOA-A-50018-5.3 ..... p 251 N94-34108

INT-PATENT-CLASS-A61F-2/54 . p 259 N94-35115 *
INT-PATENT-CLASS-A61F-2/58 . p 259 N94-35115 *
INT-PATENT-CLASS-A61F-2/66 . p 259 N94-35115 *

ISBN-9-51-221845-3 ..... p 251 N94-34699 #

LA-UR-93-3960 ..... p 243 N94-33734 #

NAS 1.15:104795 ..... p 257 N94-33957 * #
NAS 1.15:108457 ..... p 258 N94-33973 * #
NAS 1.15:108803 ..... p 259 N94-34951 * #
NAS 1.15:108823 ..... p 252 N94-33608 * #
NAS 1.21:7011(390) ..... p 248 N94-34602 *
NAS 1.26:177640 ..... p 258 N94-34706 * #

NASA-CASE-MFS-28707-1 ..... p 259 N94-35115 *

NASA-CR-177640 ..... p 258 N94-34706 * #

NASA-SP-7011(390) ..... p 248 N94-34602 *

NASA-TM-104795 ..... p 257 N94-33957 * #
NASA-TM-108457 ..... p 258 N94-33973 * #
NASA-TM-108803 ..... p 259 N94-34951 * #
NASA-TM-108823 ..... p 252 N94-33608 * #
NASA-TM-109808 ..... p 243 N94-33770 *
NASA-TM-109812 ..... p 243 N94-33564 *

NMRI-94-0003 ..... p 247 N94-34005 #

NONP-VT-94-12936 ..... p 243 N94-33770 *
NONP-VT-94-12940 ..... p 243 N94-33564 *

PB94-149234 ..... p 251 N94-34108
PB94-149622 ..... p 247 N94-34111

PRG-109 ..... p 247 N94-34111

S-769 ..... p 257 N94-33957 * #

US-PATENT-APPL-SN-842287 ..... p 257 N94-33781
US-PATENT-APPL-SN-912953 ..... p 259 N94-35115 *

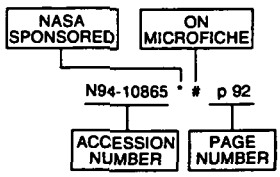
US-PATENT-CLASS-359-234 ..... p 257 N94-33781
US-PATENT-CLASS-623-57 ..... p 259 N94-35115 *
US-PATENT-CLASS-623-59 ..... p 259 N94-35115 *
US-PATENT-CLASS-623-60 ..... p 259 N94-35115 *

US-PATENT-5,255,117 ..... p 257 N94-33781
US-PATENT-5,314,500 ..... p 259 N94-35115 *

USAATCOM-TR-94-A-012 ..... p 258 N94-34706 * #

ACCESSION NUMBER INDEX

Typical Accession Number Index Listing



Listings in this index are arranged alphanumerically by accession number. The page number indicates the page on which the citation is located. The accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

A94-60201 p 244
A94-60203 p 244

N94-33380 # p 244
N94-33499 * # p 244
N94-33545 # p 244
N94-33564 * p 243
N94-33589 p 252
N94-33595 p 248
N94-33608 * # p 252
N94-33613 * # p 252
N94-33619 * # p 252
N94-33620 * # p 252
N94-33621 * # p 253
N94-33622 * # p 248
N94-33623 * # p 248
N94-33624 * # p 249
N94-33625 * # p 249
N94-33627 * # p 253
N94-33628 * # p 253
N94-33629 * # p 253
N94-33630 * # p 253
N94-33634 * # p 253
N94-33635 * # p 254
N94-33636 * # p 254
N94-33637 * # p 244
N94-33638 * # p 244
N94-33639 * # p 245
N94-33640 * # p 245
N94-33641 * # p 245
N94-33642 * # p 254
N94-33643 * # p 245
N94-33644 * # p 245
N94-33645 * # p 246
N94-33647 * # p 246
N94-33649 * # p 254
N94-33650 * # p 255
N94-33651 * # p 246
N94-33652 * # p 249
N94-33653 * # p 255
N94-33654 * # p 249
N94-33655 * # p 255
N94-33656 * # p 255
N94-33657 * # p 256
N94-33658 * # p 243
N94-33659 * # p 256
N94-33660 * # p 256
N94-33661 * # p 256
N94-33662 * # p 257
N94-33663 * # p 257
N94-33674 # p 249
N94-33700 p 250
N94-33707 p 257
N94-33708 p 247
N94-33734 # p 243
N94-33737 p 250
N94-33738 p 250
N94-33770 * p 243
N94-33779 p 247
N94-33781 p 257
N94-33849 p 250
N94-33857 p 250
N94-33957 * # p 257
N94-33973 * # p 258
N94-34005 # p 247
N94-34008 # p 243
N94-34024 * # p 250
N94-34025 * # p 247
N94-34035 * # p 258
N94-34044 * # p 251
N94-34045 * # p 251
N94-34108 p 251
N94-34111 p 247
N94-34210 # p 251
N94-34389 # p 258
N94-34602 * p 248
N94-34627 # p 258
N94-34695 p 248
N94-34699 # p 251
N94-34706 * # p 258
N94-34951 * # p 259
N94-35115 * p 259

AVAILABILITY OF CITED PUBLICATIONS

OPEN LITERATURE ENTRIES (A94-60000 Series)

Inquiries and requests should be addressed to: CASI, 800 Elkridge Landing Road, Linthicum Heights, MD 21090-2934. Orders are also taken by telephone, (301) 621-0390, e-mail, help@sti.nasa.gov, and fax, (301) 621-0134. Please refer to the accession number when requesting publications.

STAR ENTRIES (N94-10000 Series)

One or more sources from which a document announced in *STAR* is available to the public is ordinarily given on the last line of the citation. The most commonly indicated sources and their acronyms or abbreviations are listed below, and their addresses are listed on page APP-3. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

Avail: CASI. Sold by the NASA Center for AeroSpace Information. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code following the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page APP-5.

NOTE ON ORDERING DOCUMENTS: When ordering publications from CASI, use the N accession number or other report number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts*. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center - Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: ESDU. Pricing information on specific data, computer programs, and details on Engineering Sciences Data Unit (ESDU) topic categories can be obtained from ESDU International Ltd. Requesters in North America should use the Virginia address while all other requesters should use the London address, both of which are on page APP-3.

Avail: Fachinformationszentrum Karlsruhe. Gesellschaft für wissenschaftlich-technische Information mbH 76344 Eggenstein-Leopoldshafen, Germany.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, CA. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration (JBD-4), Public Documents Room (Room 1H23), Washington, DC 20546-0001, or public document rooms located at NASA installations, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: NTIS. Sold by the National Technical Information Service. Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) are available. For information concerning this service, consult the NTIS Subscription Section, Springfield, VA 22161.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.

Avail: US Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of $1.50 each, postage free.

Avail: (US Sales Only). These foreign documents are available to users within the United States from the National Technical Information Service (NTIS). They are available to users outside the United States through the International Nuclear Information Service (INIS) representative in their country, or by applying directly to the issuing organization.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed on page APP-3. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

FEDERAL DEPOSITORY LIBRARY PROGRAM

In order to provide the general public with greater access to U.S. Government publications, Congress established the Federal Depository Library Program under the Government Printing Office (GPO), with 53 regional depositories responsible for permanent retention of material, inter-library loan, and reference services. At least one copy of nearly every NASA and NASA-sponsored publication, either in printed or microfiche format, is received and retained by the 53 regional depositories. A list of the regional GPO libraries, arranged alphabetically by state, appears on the inside back cover of this issue. These libraries are *not* sales outlets. A local library can contact a regional depository to help locate specific reports, or direct contact may be made by an individual.

PUBLIC COLLECTION OF NASA DOCUMENTS

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England for public access. The British Library Lending Division also has available many of the non-NASA publications cited in *STAR.* European requesters may purchase facsimile copy or microfiche of NASA and NASA-sponsored documents, those identified by both the symbols # and * from ESA — Information Retrieval Service European Space Agency, 8-10 rue Mario-Nikis, 75738 CEDEX 15, France.

STANDING ORDER SUBSCRIPTIONS

NASA SP-7011 supplements and annual index are available from the NASA Center for AeroSpace Information (CASI) on standing order subscription. Standing order subscriptions do not terminate at the end of a year, as do regular subscriptions, but continue indefinitely unless specifically terminated by the subscriber.

ADDRESSES OF ORGANIZATIONS

British Library Lending Division
Boston Spa, Wetherby, Yorkshire
England

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, DC 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, TN 37830

European Space Agency-
Information Retrieval Service ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

Engineering Sciences Data Unit International
P.O. Box 1633
Manassas, VA 22110

Engineering Sciences Data Unit
International, Ltd.
251-259 Regent Street
London, W1R 7AD, England

Fachinformationszentrum Karlsruhe
Gesellschaft für wissenschaftlich-technische
Information mbH
76344 Eggenstein-Leopoldshafen, Germany

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Center for AeroSpace Information
800 Elkridge Landing Road
Linthicum Heights, MD 21090-2934

National Aeronautics and Space Administration
Scientific and Technical Information Program
(JTT)
Washington, DC 20546-0001

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, CA 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, MI 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey Library National Center
MS 950
12201 Sunrise Valley Drive
Reston, VA 22092

U.S. Geological Survey Library
2255 North Gemini Drive
Flagstaff, AZ 86001

U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025

U.S. Geological Survey Library
Box 25046
Denver Federal Center, MS914
Denver, CO 80225

Page Intentionally Left Blank

CASI PRICE TABLES

STANDARD PRICE DOCUMENTS

PRICE CODE	NORTH AMERICAN PRICE	FOREIGN PRICE
A01	$ 9.00	$ 18.00
A02	12.50	25.00
A03	17.50	35.00
A04-A05	19.50	39.00
A06-A09	27.00	54.00
A10-A13	36.50	73.00
A14-A17	44.50	89.00
A18-A21	52.00	104.00
A22-A25	61.00	122.00
A99	Call For Price	Call For Price

MICROFICHE

PRICE CODE	NORTH AMERICAN PRICE	FOREIGN PRICE
A01	$ 9.00	$ 18.00
A02	12.50	25.00
A03	17.50	35.00
A04	19.50	39.00
A06	27.00	54.00
A10	36.50	73.00

IMPORTANT NOTICE

CASI Shipping and Handling Charges
U.S.—ADD $3.00 per TOTAL ORDER
Canada and Mexico—ADD $3.50 per TOTAL ORDER
All Other Countries—ADD $7.50 per TOTAL ORDER
Does NOT apply to orders
requesting CASI RUSH HANDLING.
CASI accepts most credit/charge cards.

NASA Center for AeroSpace Information
800 Elkridge Landing Road
Linthicum Heights, MD 21090-2934
Telephone: (301) 621-0390
E-mail: help@sti.nasa.gov
Fax: (301) 621-0134

REPORT DOCUMENT PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA SP-7011 (392)		

4. Title and Subtitle	5. Report Date
Aerospace Medicine and Biology A Continuing Bibliography (Supplement 392)	September 1994
	6. Performing Organization Code JTT
7. Author(s)	8. Performing Organization Report No.
	10. Work Unit No.
9. Performing Organization Name and Address NASA Scientific and Technical Information Program	11. Contract or Grant No.
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, DC 20546-0001	13. Type of Report and Period Covered Special Publication
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This report lists 81 reports, articles and other documents recently announced in the NASA STI Database.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Aerospace Medicine Bibliographies Biological Effects	Unclassified - Unlimited Subject Category - 52

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	52	A04/HC

For sale by the NASA Center for AeroSpace Information, 800 Elkridge Landing Road, Linthicum Heights, MD 21090-2934

FEDERAL REGIONAL DEPOSITORY LIBRARIES

ALABAMA

AUBURN UNIV. AT MONTGOMERY LIBRARY
Documents Dept.
7300 University Dr.
Montgomery, AL 36117-3596
(205) 244-3650 Fax: (205) 244-0678

UNIV. OF ALABAMA
Amelia Gayle Gorgas Library
Govt. Documents
Box 870266
Tuscaloosa, AL 35487-0266
(205) 348-6046 Fax: (205) 348-8833

ARIZONA

DEPT. OF LIBRARY, ARCHIVES, AND PUBLIC RECORDS
Federal Documents
Third Floor State Capitol
1700 West Washington
Phoenix, AZ 85007
(602) 542-4121 Fax: (602) 542-4400, 542-4500

ARKANSAS

ARKANSAS STATE LIBRARY
State Library Services
One Capitol Mall
Little Rock, AR 72201
(501) 682-2869

CALIFORNIA

CALIFORNIA STATE LIBRARY
Govt. Publications Section
914 Capitol Mall - P.O. Box 942837
Sacramento, CA 94237-0001
(916) 322-4572 Fax: (916) 324-8120

COLORADO

UNIV. OF COLORADO - BOULDER
Norlin Library
Govt. Publications
Campus Box 184
Boulder, CO 83309-0184
(303) 492-8834 Fax: (303) 492-2185

DENVER PUBLIC LIBRARY
Govt. Publications Dept. BS/GPD
1357 Broadway
Denver, CO 80203
(303) 571-2135

CONNECTICUT

CONNECTICUT STATE LIBRARY
231 Capitol Avenue
Hartford, CT 06106
(203) 566-4971 Fax: (203) 566-3322

FLORIDA

UNIV. OF FLORIDA LIBRARIES
Documents Dept.
Library West
Gainesville, FL 32611-2048
(904) 392-0366 Fax: (904) 392-7251

GEORGIA

UNIV. OF GEORGIA LIBRARIES
Govt. Documents Dept.
Jackson Street
Athens, GA 30602
(404) 542-8949 Fax: (404) 542-6522

HAWAII

UNIV. OF HAWAII
Hamilton Library
Govt. Documents Collection
2550 The Mall
Honolulu, HI 96822
(808) 948-8230 Fax: (808) 956-5968

IDAHO

UNIV. OF IDAHO LIBRARY
Documents Section
Moscow, ID 83843
(208) 885-6344 Fax: (208) 885-6817

ILLINOIS

ILLINOIS STATE LIBRARY
Reference Dept.
300 South Second
Springfield, IL 62701-1796
(217) 782-7596 Fax: (217) 524-0041

INDIANA

INDIANA STATE LIBRARY
Serials/Documents Section
140 North Senate Avenue
Indianapolis, IN 46204
(317) 232-3678 Fax: (317) 232-3728

IOWA

UNIV. OF IOWA LIBRARIES
Govt. Publications Dept.
Washington & Madison Streets
Iowa City, IA 52242
(319) 335-5926 Fax: (319) 335-5830

KANSAS

UNIV. OF KANSAS
Govt. Documents & Map Library
6001 Malott Hall
Lawrence, KS 66045-2800
(913) 864-4660 Fax: (913) 864-5380

KENTUCKY

UNIV. OF KENTUCKY LIBRARIES
Govt. Publications/Maps Dept.
Lexington, KY 40506-0039
(606) 257-3139 Fax: (606) 257-1563, 257-8379

LOUISIANA

LOUISIANA STATE UNIV.
Middleton Library
Govt. Documents Dept.
Baton Rouge, LA 70803
(504) 388-2570 Fax: (504) 388-6992

LOUISIANA TECHNICAL UNIV.
Prescott Memorial Library
Govt. Documents Dept.
305 Wisteria Street
Ruston, LA 71270-9985
(318) 257-4962 Fax: (318) 257-2447

MAINE

TRI-STATE DOCUMENTS DEPOS.
Raymond H. Fogler Library
Govt. Documents & Microforms Dept.
Univ. of Maine
Orono, ME 04469
(207) 581-1680

MARYLAND

UNIV. OF MARYLAND
Hornbake Library
Govt. Documents/Maps Unit
College Park, MD 20742
(301) 454-3034 Fax: (301) 454-4985

MASSACHUSETTS

BOSTON PUBLIC LIBRARY
Govt. Documents Dept.
666 Boylston Street
Boston, MA 02117
(617) 536-5400 ext. 226
Fax: (617) 267-8273, 267-8248

MICHIGAN

DETROIT PUBLIC LIBRARY
5201 Woodward Avenue
Detroit, MI 48202-4093
(313) 833-1440, 833-1409
Fax: (313) 833-5039

LIBRARY OF MICHIGAN
Govt. Documents Unit
P.O. Box 30007
Lansing, MI 48909
(517) 373-0640 Fax: (517) 373-3381

MINNESOTA

UNIV. OF MINNESOTA
Wilson Library
Govt. Publications Library
309 19th Avenue South
Minneapolis, MN 55455
(612) 624-5073 Fax: (612) 626-9353

MISSISSIPPI

UNIV. OF MISSISSIPPI
J.D. Williams Library
Federal Documents Dept.
106 Old Gym Bldg.
University, MS 38677
(601) 232-5857 Fax: (601) 232-5453

MISSOURI

UNIV. OF MISSOURI - COLUMBIA
Ellis Library
Govt. Documents
Columbia, MO 65201
(314) 882-6733 Fax: (314) 882-8044

MONTANA

UNIV. OF MONTANA
Maureen & Mike Mansfield Library
Documents Div.
Missoula, MT 59812-1195
(406)243-6700 Fax: (406) 243-2060

NEBRASKA

UNIV. OF NEBRASKA - LINCOLN
D.L. Love Memorial Library
Documents Dept.
Lincoln, NE 68588
(402) 472-2562

NEVADA

UNIV. OF NEVADA
Reno Library
Govt. Publications Dept.
Reno, NV 89557
(702) 784-6579 Fax: (702) 784-1751

NEW JERSEY

NEWARK PUBLIC LIBRARY
U.S. Documents Div.
5 Washington Street - P.O. Box 630
Newark, NJ 07101-0630
(201) 733-7812 Fax: (201) 733-5648

NEW MEXICO

UNIV. OF NEW MEXICO
General Library
Govt. Publications Dept.
Albuquerque, NM 87131-1466
(505) 277-5441 Fax: (505) 277-6019

NEW MEXICO STATE LIBRARY
325 Don Gaspar Avenue
Santa Fe, NM 87503
(505) 827-3826 Fax: (505) 827-3820

NEW YORK

NEW YORK STATE LIBRARY
Documents/Gift & Exchange Section
Federal Depository Program
Cultural Education Center
Albany, NY 12230
(518) 474-5563 Fax: (518) 474-5786

NORTH CAROLINA

UNIV. OF NORTH CAROLINA - CHAPEL HILL
CB#3912, Davis Library
BA/SS Dept. - Documents
Chapel Hill, NC 27599
(919) 962-1151 Fax: (919) 962-0484

NORTH DAKOTA

NORTH DAKOTA STATE UNIV. LIB.
Documents Office
Fargo, ND 58105
(701) 237-8886 Fax: (701) 237-7138
In cooperation with Univ. of North Dakota, Chester Fritz Library
Grand Forks

OHIO

STATE LIBRARY OF OHIO
Documents Dept.
65 South Front Street
Columbus, OH 43266
(614) 644-7051 Fax: (614) 752-9178

OKLAHOMA

OKLAHOMA DEPT. OF LIBRARIES
U.S. Govt. Information Div.
200 NE 18th Street
Oklahoma City, OK 73105-3298
(405) 521-2502, ext. 252, 253
Fax: (405) 525-7804

OKLAHOMA STATE UNIV.
Edmon Low Library
Documents Dept.
Stillwater, OK 74078
(405) 744-6546 Fax: (405) 744-5183

OREGON

PORTLAND STATE UNIV.
Millar Library
934 SW Harrison - P.O. Box 1151
Portland, OR 97207
(503) 725-3673 Fax: (503) 725-4527

PENNSYLVANIA

STATE LIBRARY OF PENN.
Govt. Publications Section
Walnut St. & Commonwealth Ave. - P.O. Box 1601
Harrisburg, PA 17105
(717) 787-3752

SOUTH CAROLINA

CLEMSON UNIV.
Cooper Library
Public Documents Unit
Clemson, SC 29634-3001
(803) 656-5174 Fax: (803) 656-3025
In cooperation with Univ. of South Carolina, Thomas Cooper Library, *Columbia*

TENNESSEE

MEMPHIS STATE UNIV. LIBRARIES
Govt. Documents
Memphis, TN 38152
(901) 678-2586 Fax: (901) 678-2511

TEXAS

TEXAS STATE LIBRARY
United States Documents
P.O. Box 12927 - 1201 Brazos
Austin, TX 78711
(512) 463-5455 Fax: (512) 463-5436

TEXAS TECH. UNIV. LIBRARY
Documents Dept.
Lubbock, TX 79409
(806) 742-2268 Fax: (806) 742-1920

UTAH

UTAH STATE UNIV.
Merrill Library & Learning Resources Center, UMC-3000
Documents Dept.
Logan, UT 84322-3000
(801) 750-2684 Fax: (801) 750-2677

VIRGINIA

UNIV. OF VIRGINIA
Alderman Library
Govt. Documents
Charlottesville, VA 22903-2498
(804) 824-3133 Fax: (804) 924-4337

WASHINGTON

WASHINGTON STATE LIBRARY
Document Section
MS AJ-11
Olympia, WA 98504-0111
(206) 753-4027 Fax: (206) 753-3546

WEST VIRGINIA

WEST VIRGINIA UNIV. LIBRARY
Govt. Documents Section
P.O. Box 6069
Morgantown, WV 26506
(304) 293-3640

WISCONSIN

ST. HIST. SOC. OF WISCONSIN LIBRARY
Govt. Publications Section
816 State Street
Madison, WI 53706
(608) 262-2781 Fax: (608) 262-4711
In cooperation with Univ. of Wisconsin - Madison, Memorial Library

MILWAUKEE PUBLIC LIBRARY
Documents Div.
814 West Wisconsin Avenue
Milwaukee, WI 53233
(414) 278-2167 Fax: (414) 278-2137

POSTMASTER
Address Correction Requested
(Sections 137 and 159 Post Manual)

National Aeronautics and
Space Administration
Code JTT
Washington, DC 20546-0001

Official Business
Penalty for Private Use, $300

BULK RATE
POSTAGE & FEES PAID
NASA
PERMIT No. G-27